Chicago Natural History Museum

BULLETIN

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PAINTINGS CONTRAST MODERN WHALING METHODS WITH DAYS OF 'MOBY DICK'

WHALING SCENE IN THE ANTARCTIC

The Antarctic is the center of modern whaling activities. A "factory ship" is in the distance, at the right. Killer boats have surrounded a herd of humpback whales, and one is cautiously swinging around while the man operating a harpoon cannon is attempting to get the surfacing whale in his sights. The whale is soon dispatched and "flagged" like the dead humpback floating in the foreground.

THE FACTORY SHIP

The "factory ship" is most remarkable development in modern whaling. A ship of this type can handle at least ten whales a day. A killer boat is shown that has just towed in four whales. A whale is being drawn up to the "flensing deck" where it will be cut up. The blubber is boiled with steam, and the whale oil drawn off to storage tanks. Some of the meat may be used for human food.

SHORE STATION WHALING—HAULING OUT

Typical of Alaskan whaling stations, the scene is in a quiet, practically landlocked harbor. A lighthouse guides the "killer boats" home. The great sloping slip and the pier are built on piles. The men at work on a skinned whale have drawn it out of the way to cut it up and make room for a huge blue whale, which is being drawn up in its turn to be skinned. Three more dead whales are tied to the slip.

SHORE STATION WHALING—FLENSING

A sperm whale drawn up on the slip with a donkey engine, has had the flipper removed. Long incisions have been made lengthwise and crosswise, and a chain, fastened to the "blanket piece" of blubber by block and tackle, is peeling it from the carcass. The blanket pieces are then cut up and dragged to the mincers and "tried out" for the oil, which is stored in tanks. The head is removed and the spermaceti salvaged.

Paintings by Staff Artist Arthur G. Rueckert

(See story on page 2)

SHOUT
SHARE
IT

WHALES AND MAN

(See pictures on page 1)

By KARL P. SCHMIDT
CHIEF CURATOR, DEPARTMENT OF ZOOLOGY

The natural history of whales is so much known to us through the operations of whaling that it is difficult to think of these largest of all living creatures without reference to the important economic aspects of their use by man.

The romance associated with the sailing ship era of the New England whale fishery of the early part of the nineteenth century makes us peculiarly conscious, as Americans, of whaling. It is thus fitting that one of the greatest and most essentially American literary works—*Moby Dick*, by Herman Melville—should have its scene in the South Pacific and its theme the contest with the "monsters of the deep" and, in a vast allegory, the defiance of God by man.

It was therefore regarded as appropriate to place a mural painting representing the climax of a whale hunt of sailing ship days at the end of the Museum's Hall of Whales (Hall N-1). This is now supplemented by a recently installed series of four paintings by Mr. Arthur G. Rueckert, Staff Artist, representing the extraordinary developments of modern whaling. In these he illustrates the two principal methods now employed—whaling with a large "factory ship" and whaling from a shore station served by small "killer boats."

HISTORY OF WHALING

Man's first contact with whales must have been through the not infrequent occurrence of stranded individuals even on thickly inhabited coasts. Primitive man must have made use of such stranded carcasses for food. Actual capture of whales by the Eskimos, by harpooning them in narrow channels between ice floes, must go back to prehistoric times, and must long antedate the first records of European whaling by the Norsemen, as early as the ninth century, and by the Basques, in the Bay of Biscay, in the thirteenth century.

The leadership in the whaling industry passed from one seafaring people to another—to the Dutch in the early seventeenth century, then to the English, then, by the early 1800s, to the New Englanders.

In the redevelopment of whaling in modern times, the Norwegians have taken the lead, and have been most actively emulated by the Japanese. In modern times, Great Britain has taken the lead in the scientific study of whales. Special vessels, the *Discovery* and the *William Scoresby*, and a shore station on far-off South Georgia, in the Atlantic east of the southern tip of South America, have been devoted to this purpose.

By far the most important among the various products obtained from whales is the oil tried out from the thick coat of blubber that protects the animal from cold and streamlines its body. The use of whale oil has varied with changes in our industrial culture. One of the factors that put an end to the New England whaling industry was the substitution of kerosene for whale oil in lighting.

Whale oil from blubber is a fat, and goes into many industrial uses, especially soap. The fine waxy oil from the head of the sperm whale, spermaceti, is especially valued as a non-gumming lubricant.

Whale flesh, long neglected as a food for man, is now coming into use in Europe and Japan at about half the price of beef. In modern whaling, the blood, otherwise unused parts of the flesh and viscera, and bones are dried for use as fertilizer.

The curious product ambergris, which has had a use in perfumery since ancient times, is a biliary deposit in the intestines of apparently diseased sperm whales. It has a high, though presumably diminishing, value in the modern perfume trade.

The influence of human fashions in the era of stayed women's garments in the eighteenth century led almost to the extinction of the great Greenland whale when the price of whalebone rose to more than $1,400 per ton. Steel and plastic stays now replace whalebone for stays in corsets, and fine whalebone, used for other purposes, now brings the much higher price of some $5 a *pound*! because of the scarcity of the species of whales that produce it.

The rise of modern whaling dates essentially from the use of steamships and perhaps most particularly from the invention of the harpoon cannon known as the Sven Foyn gun. This deadly weapon shoots a harpoon of 100 pounds weight carrying an explosive charge in its shaft; and this instrument more than any other, has increased the efficiency and reduced the hazards of the old "hand lance" whaling. With "killer boats" equipped with the harpoon gun, whaling is being carried on in both Arctic and Antarctic waters by means of shore stations, to which the whales are towed for processing.

'FLOATING FACTORIES'

The most spectacular of the developments of the commercial pursuit of whales is the development of "floating factories." Such a vessel is large enough to draw a whale carcass to its deck by means of a ramp through the bow or stern; and cutting up, trying out of the blubber, and processing of the meat and bones is carried on efficiently and mechanically.

Staff Artist Rueckert's four new paintings depict: (1) Killer boats from a "factory ship" using the explosive harpoon bomb; (2) a factory ship to which killer boats have just returned with several whales; (3) hauling out whales at a typical shore whaling station of the type established in Alaska; and (4) operations in the processing of whales at a shore station.

Even before the development of the modern killing devices, certain species of whales had reached the verge of extinction, and others had been eliminated from seas where they were formerly abundant. Now, with the pre-war destruction of more than 12,000 whales per annum, and with the threat that radio and radar will still further increase the destructiveness of whaling operations, it is evident to all far-sighted members of the whaling industry that further decline in the numbers of whales will soon increase operational costs and reduce income to a point at which whaling will disappear.

It is not unlikely, therefore, that the approach to extinction may actually operate as the best conservation measure. The chemical industry may be expected to develop synthetic substitutes for whale oil, especially as its costs and price increase.

International efforts for the control of whaling and the protection of the scarcer species (such as the all but extinct Greenland whale) have resulted in agreements and limitations looking in the direction of complete regulation and stabilization of the industry. The United States, with Antarctic possessions of its own, has now followed the lead of Great Britain in promoting scientific studies on whales on which long-term policies can be based.

Photo Entries Close Jan. 18; Exhibit Opens Feb. 1

The deadline for entries in the Second Chicago International Exhibition of Nature Photography to be held by the Nature Camera Club of Chicago at the Museum is January 18.

The exhibition will be held in Stanley Field Hall Feb. 1 to 28 inclusive. In addition to the photograph display, projections of color slides will be presented on the screen in the Museum lecture hall on three Sunday afternoons, February 2, 9 and 16 at 3 o'clock.

Entry forms and rules may be obtained from the Museum or from Miss Louise K. Broman, 6058 South Troy St., Chicago 29.

Expedition to Cuba

Dr. B. E. Dahlgren, Curator Emeritus of Botany, is leaving January 4 for an expedition in Cuba and Haiti. He will remain several months collecting material needed for addition to the Museum's extensive collection of palms, and other items needed by the Department of Botany.

Specimens of the gold, silver, lead, and platinum ores of the world, geographically arranged by countries, states, and mining districts, are on display in Frederick J. V. Skiff Hall (Hall 37).

TWO 'MAN-KILLERS': THE ELECTRIC EEL AND CANNIBAL FISH ADDED TO EXHIBITS

By JOHN W. WINN
ASSISTANT, DIVISION OF FISHES

Two "man-killing fishes" are represented among several models recently added to the exhibits in the Hall of Fishes (Hall O). They are the electric eel and the piranha or cannibal fish.

The installation of these and other recently added fish models carries forward the purpose of the arrangement of the various types in a linear series to indicate the systematic relationships of different species to each other and to show the parallel development of similar structures and patterns. This addition is noteworthy in that first, two families of fishes, heretofore not shown in the exhibits of the Museum, are now represented, and second, two of the species displayed are perhaps the most storied of New World fishes.

THE ELECTRIC EEL, "A 500-VOLT FISH"

This creature, if alive, would deliver a paralyzing and possibly killing electric shock were it to be held as Mrs. Helen Moyer of the Museum's staff is doing in the above photograph.

The natural history of the electric eel, *Electrophorus electricus*, the first of the new fishes, is well documented in both legend and by observation and authentic report. First observed late in the 17th century by the French astronomer and mathematician, Richer, in Guiana, it was made known to science in Europe in 1729, when a description of its electrical powers was first published. It has since been the subject of a voluminous literature.

POWERFUL ELECTRIC SHOCK

Known chiefly for its remarkable ability to deliver powerful shocks, the electric eel derives its common name from this property and from its body form, which may be described as elongate, cylindrical, and scaleless—in other words, "eel-like." This resemblance to an eel, however, is more apparent than real, for it is not a true eel, but a member of a group of Central and South American fishes called the Gymnotids, related to the characins and presumably descended from some primitive member of the family Characidae, of which the second of the new fishes, the piranha, *Serrasalmo rhombeus*, is a more or less typical example.

Certain uniformities in basic morphology relate these two forms to the suckers, the carps and minnows, the loaches, and the catfishes. Therefore, the electric eel and the piranha are placed in the same case with these latter types. Also to be found in this case is the third of the new fishes, the common shiner, *Notropis cornutus*, representing together with the much larger carp, *Cyprinus carpio*, the family Cyprinidae.

The capacity for delivering electric shocks has developed in other fishes besides the electric eel. Among these are the electric rays of the Atlantic and southern seas, the electric catfish of Africa, the various species of *Mormyrus* and *Gymnarchus* of Africa, and the stargazer, *Astroscopus*. In most of these species, the source of the electric power lies in the great lateral swimming muscles, modified to become essentially structures for the production and storage of electricity. In the African electric catfish, *Malopterurus electricus*, however, the electric tissue appears to be derived from the epidermis, and in the stargazer, the electric organ is located on top of the head between the eyes.

BATTERY-LIKE ORGANS

In the electric eel the source of the power lies in three sets of special organs derived from certain muscles of the tail. The head and viscera occupy the front one-fifth of the body, the remaining four-fifths comprising the tail containing the swimming muscles and the electric organs. The large electric organs, delivering the major discharge, lie under the muscle tracts of the back.

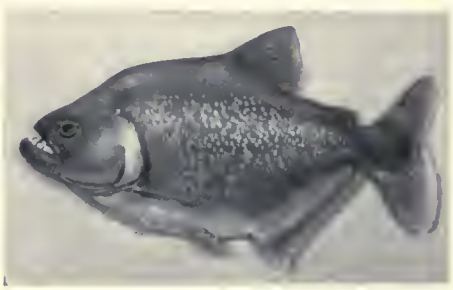
A smaller pair, Hunter's organs, lying on either side of the anal fin muscles, delivers an irregular discharge supplementing that of the large organs. The third pair, Sach's bundles, arising about midway in the length of the fish and closely associated with the large organs throughout the remaining distance to the end of the body, delivers a minor discharge thought to serve as a warning device. The major discharge of the large organs augmented by the irregular discharge of Hunter's organs is brought into play to repel an aggressive attacker that has failed to be discouraged by the warning discharge, and to stun or kill the small fishes sought as food. Recent studies revealed an electromotive force of the major discharge as high as 500 volts in a three-foot specimen.

KNOCKS OUT MAN OR HORSE

In actual performance, it is reported the electric eel is able to stun and knock down men and even horses entering the streams and pools inhabited by it. Although actual contact with the eel produces the greatest shock, its electricity is communicated through the water and may be felt at some distance from the discharging eel. Direct contact can produce almost complete temporary paralysis in a man. Growing to a length of eight feet and the thickness of a man's thigh, the fish is respected and feared by the natives of the Guianas and Brazil.

Although a sluggish swimmer, the electric eel suffers apparently not at all from its lack of speed.

It is interesting to note that the electric eel may swim forward or backward with equal ease merely by reversing the direction of the waves or undulations running along its lengthy and flexible anal fin. The fish must rise to the surface approximately every four minutes to gulp air.



PIRANHA OR CANNIBAL FISH

One of the most ferocious of flesh-eating fishes, it will attack man or beast with its bulldog-like jaws.

Feared no less than the electric eel in the streams of South America is the formidable piranha, or cannibal fish, whose bloodthirsty appetite for animal flesh makes it the scourge of the waters it inhabits. Its ferocity is belied by its size, ranging from just a few inches to about a foot in length. Its bulldog-like jaws, armed with two dozen or so sharp triangular teeth, enable it to tear chunks of flesh from man or beast coming into contact with it. It is said that piranhas attacking in schools clean the flesh from the bones of an animal in short order if it is unable to make its escape almost immediately.

The models were prepared by Staff Taxidermist Leon L. Pray.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the the postage on shipments.)*

A Treasury of Science. Edited by Harlow Shapley, Samuel Rapport, and Helen Wright. Harper and Bros., New York (second ed.), $3.95.

The collection of essays presented by Dr. Shapley and his associates is intended to bridge the gap between scientist and non-scientist, and equally the one in the scientist's own mind produced by the fact that he is a specialist in his own field and a layman in every other department of science.

This is a laudable aim, and perhaps should stand at the forefront of every educational endeavor. The battle between classical education and scientific education has been a long one. That the scientific outlook has won has been grudgingly conceded even by its opponents, since, as Chancellor Robert Maynard Hutchins of the University of Chicago has said, the scientists may now threaten to blow up the world if they do not have their victory.

It would be an empty victory if we should fail to recognize that education in the sciences has its own humanistic values and indeed is prepared to maintain the humanities in education with no change except in viewpoint and perspective.

That scientific matters may be discussed in every-day language; that scientific method is no strange magic but merely the systematized common sense of the common man; that science may concern itself with the wonder and beauty of the world and of the universe; and that there is high romance and adventure in the careers offered by the pursuit of science, are the lessons to be derived from this book.

The choice of excerpts from the older literature is excellent, and that from the modern literature requires only the reservation that the literature is vast and that there is room for many more such "treasuries of science" to keep the classics of scientific insight available to the reading public.

KARL P. SCHMIDT, *Chief Curator, Zoology.*

LAUFER'S FAMOUS "JADE" IN NEW EDITION

In 1912, the Museum (then Field Museum of Natural History) published a monograph entitled *Jade, A Study in Chinese Archaeology and Religion,* by the late Berthold Laufer, then Chief Curator of Anthropology. The publication was immediately in great demand and came to be looked upon as the outstanding work on this subject. It is probably Dr. Laufer's most famous opus. After more than thirty years, it still stands as the most authoritative source to which scholars, students, and collectors can turn. The edition was exhausted in 1945, and arrangements were made to reprint the work, as no other study of jade had appeared to supplant Dr. Laufer's original text.

The new edition has now been published, by P.D. and Ione Perkins, of South Pasadena, California. Copies are now available in the Book Shop of the Museum at $12.50. The few copies of the original edition which had been available for some years had become a collector's item which, when obtainable, sold at $50 a copy.

Dr. Laufer was not interested in publishing a mere catalogue or in making a study of jade for its own sake. He intended his study to form the "background, the leading motive, for the exposition of some fundamental ideas of Chinese religious concepts which find their most characteristic expression and illustration in objects of jade.

"To trace their relation to thought was therefore my chief aim," he wrote, "and hence the result has rather become a contribution to the psychology of the Chinese."

"Nature Worship," the most ancient religion in China, existed before Taoism, Confucianism, or Buddhism. Dr. Laufer endeavored to establish a correlation between this religion and the jade objects he described. He based many of his ideas on the writings of Chinese authorities and he had received from colleagues in the field some criticisms of his sources.

He himself had recognized some defects in his research and he had planned to remedy these in a later edition, but unfortunately, he never found the leisure to work out a revised text, nor did he leave any notes of such a revised text. It was thought best, therefore, to reprint the text of this monumental work as he left it so that others might, as he expressed it, "take up and pursue the threads where they dropped from my hands."

CLIFFORD C. GREGG, *Director.*

PHILIPPINES EXPEDITION REPORTS PROGRESS

Captain Harry Hoogstraal, leader of the Museum's Zoological Expedition in the Philippines, reports that members of the party have obtained large collections of mammals, birds, reptiles, and insects. When last heard from they were working in Davao Province at a camp 7,200 feet above sea level in the cloud zone on Mt. McKinley, and planning a survey of Mt. Apo. The work will continue until well into the summer of 1947.

The following excerpt from one of Captain Hoogstraal's reports indicates some of the exigencies of collecting: "We are maintaining a camp at 7,200 feet in the mossy stunted forest where our life is largely an aerial one of climbing from one soggy mossy arboreal patch to another (and often hanging between them up to our armpits)! We have experienced some very rainy weather, heavy windstorms, and one locust plague at the lower camp which actually broke off the trees, but the locusts were succulent enough to reduce materially the Museum's food expenses for awhile."

A troupe of Filipinos has already been started up Mt. Apo to establish a supply base. Plans call for work around a lake, at about 7,000 feet elevation, concerning which Captain Hoogstraal has "heard fantastic stories." He reports that the vicinity "swarmed with Japanese biologists during the war." Near the lake are some bat caves which the expedition is planning soon to explore.

STAFF NOTES

Dr. Sharat K. Roy, Chief Curator of Geology, Mr. Bryan Patterson, Curator of Paleontology, Dr. Rainer A. Zangerl, Curator of Fossil Reptiles, Mr. Harry Changnon, Assistant Curator and Mr. Henry Horback, Assistant in Geology, were in the Chicago host group to the meetings of the Geological Society of America and its affiliate, the Society of Vertebrate Paleontology. The GSA met in the Stevens Hotel December 26–28; the SVP met in the Museum lecture hall December 27–29. Mr. Patterson is secretary-treasurer of the latter . . . . . *Mr. Patterson, Mr. Karl P. Schmidt, Chief Curator of Zoology, Mr. D. Dwight Davis, Curator of Anatomy and Osteology, Dr. Theodor Just, Chief Curator of Botany, and Dr. Francis Drouet, Curator of Cryptogamic Botany, will attend the meetings of the National Research Council's Committee on Common Problems in Genetics, Paleontology and Systematics at Princeton, January 2–4. Mr. Schmidt, Dr. Just and Dr. Drouet will also go to Boston to the meetings of the Society for the Study of Evolution, of which Mr. Schmidt is treasurer. Dr. Just will present a paper on "Geology and Plant Distribution."* . . . . **Marie Svoboda has been appointed as a member of the guide-lecture staff of the James Nelson and Anna Louise Raymond Foundation. She is a graduate of Northwestern University where she majored in biology.**. . . . Mr. George I. Quimby, Curator of Exhibits in the Department of Anthropology, recently spent five weeks in the eastern United States and Canada studying the exhibition, curatorial and research methods employed by 31 other principal museums. . . . *Mr. Noble Stephens, Assistant Auditor and manager of the Museum Book Shop, resigned as of December 15 to accept a position with the American Bar Association.*

SANDS FUSED BY ATOM BOMB ADDED TO EXHIBITS

Some additional material was recently added to the exhibit pertaining to atomic fission in Hall 36. The new specimens are chunks of sand, fused by the heat of the first atomic bomb dropped in tests on the New Mexico desert, into solid masses resembling impure glass, greenish brown, and slightly radio-active.

An area thousands of square feet in extent was covered with this material. The Museum's specimens are from the edge of the spot where the bomb was exploded, close to the base of the tower from which it was dropped, in the Oscura mountains about 35 miles southeast of San Antonio, New Mexico.

Only recently was clearance obtained from the War Department and the Federal Bureau of Investigation, permitting Captain James Leslie Rowe to present this material to the Museum for exhibition, according to Dr. Sharat K. Roy, Chief Curator of the Museum's Department of Geology. Captain Rowe, of the Army Corps of Engineers at Sandia Base, Albuquerque, New Mexico, was a member of the group in charge of the atomic bomb tests.

The earlier material in the exhibit consists of a series of radioactive minerals, illustrating the source of U–235, with charts and labels explaining its power, and showing the geographical distribution of uranium deposits, and other salient information.

Photo courtesy of the Chicago Sun

ATOMIC BOMB PHENOMENON

Chunks of sand fused into solid greenish-brown masses resembling impure glass, are displayed by Miss Margie Van Nordstrand, "Miss Page One" of Chicago newspaperdom, just before their addition to the Museum's exhibit pertaining to atomic fission. The sands were brought from an area in New Mexico whose surface was thus fused for thousands of square feet by the explosion of the first atomic bomb during tests.

LIFE AMONG THE MIDDLE MISSISSIPPI INDIANS, A.D. 1400–1700

By GEORGE I. QUIMBY
CURATOR OF EXHIBITS, ANTHROPOLOGY

The life and customs of the Middle Mississippi Indians are the subject of two new exhibits recently installed in the Hall of New World Archaeology (Hall B). These Indians lived in the middle southern area of the eastern United States during the Temple Mound stage, circa A.D. 1400–1700.

The numerous groups of Middle Mississippi Indians were farmers. They raised corn, squashes, beans and other crops, but also obtained some food by hunting, fishing, and gathering.

These Indians lived in large villages consisting of a big plaza or central square surrounded by houses. At each end of the plaza there were flat-topped pyramidal mounds of earth surmounted by wooden temples. Some villages were protected by palisades of upright posts.

POLE HOUSES

Houses were made of upright wooden poles, woven reeds, clay, and thatching. The frame of the house and the studding were made of poles set into the ground. The walls were made of clay plastered over a lathing of woven reeds. The roof was of poles covered with thatching.

Middle Mississippi pottery was made of clay tempered with crushed shell. There were many styles of pottery, both plain and decorated.

Tools, weapons and utensils were made of stone, bone, copper, wood, and shell. Ornaments were made of wood, shell, copper, bone, clay, and stone. Clothing was made of woven cloth and animal skins.

THE GAME OF 'CHUNKEY'

A rather spectacular game played by Middle Mississippi Indians was called "Chunkey." Chunkey was played with a slender pole of wood and a well-made disk of stone. While both players ran forward, one player rolled the chunkey stone along the ground, and still running, the other player (or both players) hurled long poles at the anticipated spot where the chunkey stone would stop rolling. The player whose pole was closest to the spent chunkey stone was the winner.

This game was played in a special place in the middle of the village square. The ceremonial aspects of the game are imperfectly known, but chunkey players are depicted in the sacred art of the Southern Death Cult which was an active organization among Middle Mississippi Indians.

The two new exhibits illustrate all of the above mentioned aspects of Middle Mississippi culture. One exhibit emphasizes the ceremonial and aesthetic life—the other, the daily life of these Indians.

These exhibits were created by Artist Gustav Dalstrom and the writer.

"CULTURAL GAP" CLOSED BY PERU EXPEDITION

The closing of a "cultural gap" between two periods of Peruvian pre-history, the first dating back some 2,000 years, is reported as an accomplishment of the Chicago Natural History Museum Archaeological Expedition to Peru.

Mr. Donald Collier, leader of the expedition and Curator of South American Archaeology and Ethnology on the Museum's staff, who has been at work in the field since May, has written to the Director, as follows:

"We are continuing to fill in the history of the Viru Valley for the past 2,000 years, and have made a noteworthy collection of artifacts for the Museum. We made a stratographic cut which reveals beautifully the cultural evolution from the Cupisnique period (earliest ceramic period at present known for Peru), and the succeeding Salinar period. Previously there had been a cultural gap between the periods. We have secured a representative collection of grave pots from the Tiahuanaco period which will make a sharper definition of the culture of that time.

"A brief survey trip was completed in the Sierra as far south as Cuzco to examine Inca pottery and architectural styles in the mountains in order better to identify the Inca period in the Viru Valley. Collections of sherds were made on important sites discovered in recent years but not yet made the subject of publications."

Mr. Collier gave an interesting picture of his solution of the housing, servant and food-economy problems. He wrote:

"I am camping at the mouth of the Viru river in a house I built myself at a cost of $15. It is fashioned out of poles and cane mats and is plastered with adobe and equipped with an adobe fireplace and chimney for heating and cooking. Thus I am now living much more comfortably than previously in the tent.

"I have a camp boy who does the cooking and dish washing. His salary is $3 a week and keep. He also keeps the camp supplied with wild doves with his muzzle-loading, cap-firing shotgun."

Mr. Collier completed his work with a trip to Trujillo to assemble his collections for shipment to Lima, and thence to New York. He arrived in New York December 19, and is expected back at his post in the Muesum the first week of January.

1,000 4-H Boys and Girls Visit the Museum

The annual delegations of rural boy and girl members of the Four-H Clubs were again visitors to the Museum last month. On December 2, a group of 700 of the girls came, and on December 4 about 300 of the boys arrived.

Chicago Natural History Museum

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Members are requested to inform the Museum promptly of changes of address.

STAFF CHANGES

Several important staff changes, to become effective January 1, 1947, are announced by Colonel Clifford C. Gregg, Director.

Dr. B. E. Dahlgren, a member of the Department of Botany since 1909, and Chief Curator of the department since 1924, is retiring from that position, but will continue his connection with the Museum as Curator Emeritus of Botany.

B. E. DAHLGREN

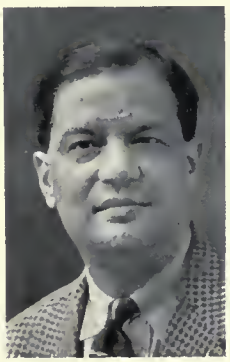
Dr. Theodor Just, who joined the staff last August as Associate Curator, has been appointed Chief Curator of the Department of Botany to succeed Dr. Dahlgren.

Dr. Sharat K. Roy, Acting Chief Curator of the Department of Geology, has been appointed Chief Curator.

Mr. Harry Changnon, Assistant in Geology since 1938, has been promoted to the position of Assistant Curator of Geology.

Mr. James R. Shouba, assistant since 1939 to Mr. W. H. Corning, General Superintendent, has been appointed to the new position of Superintendent of Maintenance; Mr. Corning continues as General Superintendent.

Dr. Roy, formerly Curator of Geology, was commissioned as a Captain in the Army Air Forces in August, 1942, and was released from military service in the spring of 1946. He returned to the Department of Geology last July 3 at which time he was appointed Acting Chief Curator of the department, to fill the vacancy occasioned by the retirement in 1944 of Mr. Henry W. Nichols. Because of his Museum experience as a member of expeditions to Newfoundland, Labrador and Baffin Land, he first served the Army on special duties in Greenland and Baffin Land. Later, he served in India as a combat intelligence officer. Dr. Roy has been a member of the staff of the Museum since 1925, serving first as an assistant curator and later as a divisional curator. He is a graduate of the University of Illinois, and earned his Ph.D. in geology at the University of Chicago.



SHARAT K. ROY

During the twenty-two years since Dr. Dahlgren acceded to the position as head of the Department of Botany, upon the death of the late Dr. C. F. Millspaugh, the botanical collections have more than doubled, and the staff and its activities have been greatly increased. The study collection of foreign woods, the cryptogamic herbarium, the collection of photographs of types and historic specimens of tropical American plants in foreign herbaria, and the palm herbarium have become distinct important features of the department. In large part through his own personal collecting on many expeditions, the botanical exhibits, that for many years were financed by President Stanley Field, have been greatly increased and improved during his time of service. Relieved of all administrative duties, he will now be able to give attention to interests which have had to be held in abeyance for lack of time and to continue his work on palms in the field and in the laboratory. He plans to leave early in January for several months' work in Cuba.

THEODOR JUST

Dr. Just came to the Museum from the University of Notre Dame, in Indiana, where he held the J. A. Nieuwland Research Professorship in Botany. He is widely known among his fellow scientists for his capable editorship of the *American Midland Naturalist* and *Lloydia*.

Mr. Eugene Richardson, Princeton University, has been appointed to a new post in the Department of Geology, as Curator of Invertebrate Fossils. Mr. Richardson, recently released from Army service, has conducted research in his field both at Princeton and for the Pennsylvania Geological Survey.

BOTANICAL EXPEDITION GOES TO CENTRAL AMERICA

The fifth botanical expedition of Chicago Natural History Museum to Central America got under way November 15 with the departure of Mr. Paul C. Standley, Curator of the Herbarium, for New Orleans to embark on the steamship *Junior*.

Mr. Standley will remain in the field through the greater part of 1947. He will make comprehensive collections of the flora of Honduras, El Salvador and Nicaragua, mostly on the Pacific slope of the countries named. His researches will be the subject of Museum publications in the future. Four previous expeditions by Mr. Standley and Dr. Julian A. Steyermark, Assistant Curator of the Herbarium, explored the twenty-two departments of Guatemala in pre-war years.

Donald Richards a Contributor

Mr. Donald Richards, Chicago businessman, was elected a Contributor (membership classification for those whose gifts range in value from $1,000 to $100,000) by the Museum's Board of Trustees at a recent meeting. The honor is in recognition of Mr. Richards' generous and notable contributions of approximately 10,000 specimens from all over the world for addition to the cryptogamic collections in the Department of Botany. Mr. Richards also serves as a volunteer assistant in botanical research, and accompanied two Museum expeditions, one to the Southwest in 1939–40, and one to California in 1941.

Technical Publications Issued

The following technical publications have been issued by Chicago Natural History Museum Press recently:

Fieldiana—Botany, Vol. 24, Part V. *Flora of Guatemala.* By Paul C. Standley and Julian A. Steyermark. Aug. 27, 1946. 502 pages. $3.50.

Fieldiana—Zoology, Vol. 31, No. 5. *Notes on Some Tropical Hawks.* By Boardman Conover. Aug. 30, 1946. 8 pages. $0.10.

Fieldiana—Zoology, Vol. 31, No. 6. *A New Rodent from the Paraguayan Chaco.* By Wilfred H. Osgood. Aug. 30, 1946. 4 pages. $0.10.

THE INCAS—SPECIAL EXHIBIT OF PHOTOGRAPHS OF PERU

"The Incas," a series of large photographs of ancient Inca ruins in Peru, was placed on exhibition December 20, and will continue on display until January 19, in Stanley Field Hall.

The exhibit consists of thirty-two panels, 28 x 38 inches each, upon which are mounted the large photographs together with captions and text. They have been exhibited by their sponsor, *Life* magazine, at museums in New York, Philadelphia, and elsewhere.

The pictures were made by Frank Scherschel, former manager of the *Milwaukee Journal's* photography department, and today one of *Life's* most traveled war photographers who worked in both the Atlantic and Pacific theaters. The exhibit is arranged by the magazine's new department of photographic exhibitions, under the direction of Mr. Thomas Mabry, formerly with the National Gallery of Art, and the Museum of Modern Art.

TIES IN WITH MUSEUM COLLECTION

Chicago Natural History Museum has long had a definite interest in research connected with the Incas who, centuries ago (about 1200–1532), built one of the world's great civilizations in the high, cold mountains of Peru. The Museum has had an archaeological expedition at work in this field from last June until December, in charge of Mr. Donald Collier, Curator of South American Ethnology and Archaeology.

In the exhibits of the Department of Anthropology's South American Hall (Hall 9) there is a large and noteworthy collection of Inca artifacts.

The photographs by Mr. Scherschel were made on a recent assignment, and reveal on the one hand the delicacy and refinement of the Incas' stone cutting and, on the other, the grandeur and nobility of Inca architecture. Perhaps the most arresting quality of Scherschel's work is that it arouses a wonder at the feat of the Incas who, without benefit of wheel, oxen, or horses and with only the strength of human backs, succeeded in moving colossal stones up towering summits where they were worked with the precision of thorough-going engineers.

Four sites are covered in detail: Sacsahuaman, Ollantaytambo, Winay Wayna and Machu Picchu. The exhibition includes many hitherto unpublished photographs.

Winay Wayna, about 60 miles northward from Cuzco, is the most recently discovered site, having been explored by the American Viking Fund in 1941. Sixteen panels are devoted to Machu Picchu, one of the best preserved Inca cities.

The photographs in their enlarged dimensions show the almost inaccessible topography of the region, and convey also something of the mystery and remoteness of the Peruvian Andes.

NEW MEMBERS

The following persons became Members of the Museum during the period from October 16 to December 14:

Contributors

Donald Richards

Associate Members

Dr. E. M. Buchner, Miss Mizpah Chenier, Knight C. Cowles, Mrs. Jack W. Hearst, Mrs. G. C. Hodgson, Charles Albee Howe, Miss Janet Patzelt, Mrs. Donald M. Ryerson, C. R. Walgreen, Jr., Lloyd R. Wolfe.

Annual Members

Albert H. Allen, Mrs. George L. Apfelbach, W. B. Brodow, H. Templeton Brown, Mrs. Isidore Brown, Leon S. Browne, Robert F. Carney, Thomas G. Cassady, David L. Coghlan, Maurice L. Cowen, Miss Edith E. Crocker, Mrs. Estella Daemicke, Mrs. John W. Dalton, Craig E. Dennison, Mrs. Frank J. Dowd, Rev. Bertil Edquist, Mrs. Elizabeth Engelhardt, J. Simon Fredrickson, Lee J. Furth, Dr. Chauncey D. Giles, Mrs. Fred A. Hansen, Homer P. Hargrave, Dr. Francis W. Hetreed, Hainer Hinshaw, Donald F. Hipskind, Mrs. J. P. Hobbs, A. Paul Holleb, William C. Howell, Dr. Torrey M. Johnson, Thomas R. King, Willard L. King, Ralph D. Kittner, Leopold Kling, George Knoll, Mrs. Harry Koplin, Miss Hattie C. Korten, Robert S. Laird, Miss Elaine Lavieri, Paul Levy, Mrs. W. E. Macfarlane, Dr. John D. MacKellar, William P. MacLean, Ralph Mansfield, Samuel K. Markman, Mrs. Augustus K. Maxwell, A. W. McMullen, Charles M. Nisen, Dr. Charles W. Olsen Mrs. Claude Irwin Palmer, Master Curtis H. Palmer, Mrs. Oscar H. Plotkin, Dr. George J. Porter, Marvin G. Probst, Murray Randolph, Max R. Rane, Egbert Robertson, Milton P. Rogers, Dr. H. M. Ross, Joseph F. Ross, K. B. Ross, Dr. Martin T. Ross, Harry Rosset, Mrs. Maurice L. Rothschild, Mrs. Harry H. Ruskin, Arnold W. Ryan, Mrs. Lawrence J. Ryan, Mrs. W. C. Sandvold, John I. Shaw, Miss Lydia E. Shirk, Malcolm E. Shroyer, David T. Siegel, Mrs. Henry L. Stein, Herbert L. Stern, Jr., Martin D. Stevers, Mrs. E. W. Stratton, George H. Taylor, Henry F. Tenney, Mrs. John W. Thomas, Sr., Mrs. G. F. Thompson, Mrs J. N. Thoren, Dr. Philip Thorek, Mrs. T. William Timpson, Louis P. Troeger, Mrs. Charles L. Trumbull, Mrs. George C. Turnbull, Dr. Herbert A. Turner, Mrs. Parkinson Unwin, Errett VanNice, Mrs. C. D. Varel, John Angus Ware, Mrs. Robert R. Ware, James E. Weber, Alexander Weiss, Leo Julius Weissenborn, Charles C. Wells, A. Herman Werth, Mrs. J. M. Westerlin, Mrs. Harold R. White, Mrs William W. Whitnell, Mrs. Charles R. Whitney, Lawrence Williams, Howard A. Wilcox, Miss S. Edna Wilson, Mrs. R. Arthur Wood, S. Roger Woolf, Ernest V. Wollard, Arthur F. Woltersdorf, T. S. Youngsma, Boleslaw Zaleski, Harry Zelzer, Elmer K. Zitzewitz.

200 OLIGOCENE ANIMAL FOSSILS COLLECTED IN TEXAS

Having completed three months of trudging back and forth over an arid area in southwestern Texas on the Mexican border, up and down hills and across desert to an aggregate of several hundred miles, in the interest of advancing paleontological science, Mr. Bryan Patterson, the Museum's Curator of Paleontology, Mr. James H. Quinn, Chief Preparator, and a volunteer companion, Mr. John Schmidt of Plainfield, Illinois, have returned bringing a collection of more than 200 specimens of prehistoric animal fossils.

The specimens are principally of mammals of the Oligocene period, about 40 million years ago. Outstanding are several skulls of Titanotheres (large horned animals whose skulls alone average 150 to 200 pounds each), skulls of amynodont rhinoceroses, and partial skeletons or skulls of small three-toed horses, an animal that appears to be a saber-tooth hyaenodont, another called an oreodont, a large rodent, and the remains of the nesting or roosting place of a large extinct bird of prey containing the bones of its rodent victims.

Of outstanding interest is the occurrence, within the same formation as the bones, of fossil footprints. These were found on the hardened surfaces of what were once stretches of sand, and are as perfectly preserved as if made yesterday. Casts were taken of many of the tracks of titanotheres, oreodonts, three-toed horses, carnivores and birds.

The area traversed lies about 50 miles south southeast of Van Horn, Texas, which is about 120 miles from El Paso and between the latter and Big Bend National Park. Most of the specimens were collected in an area approximately three miles wide and six miles long, which had to be prospected intensively, largely on foot, to find the fossils. The methods employed in hunting fossils are similar to those in prospecting for minerals. The members of the expedition had to build four miles of road to take their truck across rugged off-the-highway country in order to complete excavating and loading of the largest and heaviest specimens.

Mr. Patterson and Mr. Quinn are now back at their Museum posts ready to begin the long and intricate task of removing the fossils from the matrices of rock in which they were preserved for aeons, and to commence studies that will determine the place of the specimens in paleontological classification and trace as far as possible their bearing upon the entire question of evolution.

In Hall E, Case 29, are some ostrich eggs, a few of which are engraved with simple geometric designs. These egg shells are water containers which were used by the Bushmen of South Africa.

SUNDAY LECTURES IN JANUARY: MORNINGS AND AFTERNOONS

In January, two subjects are again offered in the Layman Lectures on Sundays by Mr. Paul G. Dallwig.

Each Sunday *morning* (Jan. 5, 12, 19, 26) at 11:30 Mr. Dallwig will present "Gems, Jewels, and 'Junk.'"

Each of the same Sunday *afternoons* at 2:30 his subject will be "Romance of Diamonds from Mine to Man."

In the morning lectures, Mr. Dallwig will tell of the superstitions surrounding gem stones which prevail in various parts of the world, leading to their being worn for protection against evil and illness, to bring good luck, to further the cause of love, and produce other desired effects. He will also discuss the difference between precious and semi-precious stones, and tell how imitation and synthetic gems are produced. Finally, he will describe how to apply tests for artificiality.

In the afternoon lectures, Mr. Dallwig will summarize the story of diamonds from the finding of the first ones in India, Brazil and Africa, and will trace the building up of the diamond industry to its present big business status. A feature of the lecture will be his recital of many stories of hate, love, greed and murder connected with the successive ownership of the world's most famous historic diamonds.

The heavy demand by the public for Mr. Dallwig's lectures, and the necessity of limiting the size of each audience, make it essential to require advance reservations. Lectures are restricted to adults. Reservations will be accepted by mail or telephone (WABash 9410).

Mr. Dallwig will not appear at the Museum during February because of out-of-town lecture engagements that month, but he will resume his Sunday schedule here on Sundays in March with "The Romance of our American Forests" (mornings), and "Miracles in Wood" (afternoons).

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last two months:

Department of Anthropology:

From: Warren Gorrell, Hinsdale, Ill.—2 Hopi pottery vessels, Arizona.

Department of Botany:

From: Jardim Botanico, Rio de Janeiro, Brazil—127 herbarium specimens; George L. Fisher, Houston, Tex.—76 herbarium specimens, Mexico; Charles A. Heath, Chicago—a painting of rice growing in India; Prof. Helen M. Gilkey, Corvallis, Ore.—a branch of noble fir; Prof. J. Soukup, Lima, Peru—102 herbarium specimens; Miss Vera Novackova, Trebic, Czechoslovakia —11 specimens of algae, Moravia; Dr. Walter Kiener, Lincoln, Neb.—130 specimens of algae, Nebraska, Minnesota, and Iowa; Dr. Fred A. Barkley, Austin, Tex.—73 cryptogams, Texas and Mexico; University of Texas, Austin—440 herbarium specimens, Texas, Mexico, and Missouri; Museo Nacional, San José, Costa Rica—372 herbarium specimens.

Department of Geology:

From: Capt. James L. Rowe, Albuquerque, N.M.—6 specimens of sand fused by atomic bomb.

Department of Zoology:

From: Illinois State Natural History Survey, Urbana, Ill.—7,522 butterflies, moths, beetles, scorpions, and other insects (the exotic insects of the late Adolf Mares' collection—Chicago); Col. Clifford C. Gregg, Valparaiso, Ind.—74 spiders, millipedes, phalangids, and insects, Jackson Township, Ind.; Museum of Comparative Zoology, Cambridge, Mass.—3,957 specimens comprising 230 lots of land and sea shells, Caribbean region; John T. McCutcheon, Chicago—a duck-billed platypus, Australia; Chicago Zoological Society, Brookfield, Ill.—13 birds, 2 mammals, and a rosy boa; Lincoln Park Zoo, Chicago—7 birds, a baby elk, and a cobra; Dr. Henry Field, Cuernavaca, Mexico—7 lizards, 12 land shells, and 65 insects and allies, Mexico; Lt. (j.g.) J. S. Kurfess, USN—56 reptiles and amphibians, Texas; Robert Weber, Highland Park, Ill.—11 mammal skeletons, Illinois; John M. Schmidt, Homewood, Ill.—40 mammal specimens and one Scott's oriole, Texas; A. J. Nicholson, Billings, Mont.—94 fox squirrel skulls, Michigan; Roger Conant, Philadelphia—6 snakes, Maryland; Charles D. Nelson, Grand Rapids, Mich.—41 specimens of fresh water shells, Ohio; Dr. Donald C. Lowrie, Las Vegas, N.M.—1,000 vials containing approximately 1,500 determined spiders, midwest United States; Melvin A. Traylor, Jr., Winnetka, Ill.—11 bird skins, Bikini; N. L. H. Krauss, Summit, Canal Zone—a frog, a toad, and 2 lizards; Dr. Georg Haas, Jerusalem, Palestine—6 chameleons; Alexander K. Wyatt, Chicago—99 insects; J. A. Slater, Urbana, Ill.—86 reptiles and amphibians, Indiana and the Ryukyu Islands; Dr. Charles H. Seevers, Chicago—600 beetles, Colombia, Mexico, and United States; Edward F. Ricketts, Pacific Grove, Calif.—727 seashells, Vancouver Island and Queen Charlotte Islands; Capt. Robert Traub, Washington, D.C.—38 beetles and bat flies; Roger Mitchell, Wheaton, Ill.—305 insects and allies; Capt. Harry Hoogstraal, U. S. Army—442 insects and allies, New Guinea and Philippine Islands; Eugene Ray, Chicago—11 insects and allies; Luis de la Torre, Ann Arbor, Mich.—10 parasitic mites and 6 fleas, Illinois; S. G. Hansen, New York—2 spiders and 6 millipedes, Bougainville and Ulithi Islands; James J. Mooney, Highland Park, Ill.—4 mink specimens, Illinois.

Library:

From: Dr. A. S. Romer, Cambridge, Mass.; Dr. Henry Field, Cuernavaca, Mexico; E. W. Gudger, New York; and Boardman Conover, Dr. Fritz Haas, William J. Gerhard, and Miss Esther Hermite, all of Chicago.

Raymond Foundation:

From: Bryan Patterson, Chicago—253 English type uncolored lantern slides on Africa, and 2 carrying cases; Charles Albee Howe, Homewood, Ill.—267 color slides; Miss Louise K. Broman, Chicago—17 kodachrome transparencies (originals) for slides; H. J. Johnson, Chicago—21 kodachrome slides.

BULLETIN RESUMES MONTHLY ISSUES

With this issue, the BULLETIN returns to a monthly basis. During the war, and in the period following, it was first reduced by suspension of summer issues, then further by reduction to a bi-monthly basis. This was necessitated by the shortage of paper and extensive staff absences on military and other services for the government.

PROGRAMS OF LECTURE TOURS FOR WEEKDAYS IN JANUARY

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays (on New Year's Day the Museum will be closed). On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays; a schedule of these follows:

Wed., Jan. 1—No tour, New Year's Day. *Museum closed.*

Fri. Jan. 3—Facts and Fallacies in Natural History (*Winona Hinkley*).

Wed. Jan. 8—Truth Is Stranger Than Fiction (*June Ruzicka*).

Fri. Jan. 10—How Animals Spend the Winter (*Lorain Farmer*).

Wed., Jan. 15—The Keeper of the Smokes—How Different Peoples Have Used Fire (*Roberta Cramer*).

Fri., Jan. 17—Plant Storehouses—Stems, Fruits, and Roots (*Miriam Wood*).

Wed., Jan. 22—The Young of Animals (*Lorain Farmer*).

Fri., Jan. 24—Heads and Tales—Famous Sculptures of the Races of Mankind (*June Ruzicka*).

Wed., Jan. 29—Designs in Wood—Tree Growths That Result in Beautiful Patterns (*Miriam Wood*).

Fri., Jan. 31—Food for the Gods—and for People (*Roberta Cramer*).

Persons wishing to participate should apply at North Entrance. Tours are free. By pre-arrangement at least a week in advance, special tours are available to groups of ten or more persons.

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BULLETIN

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2ND CHICAGO INTERNATIONAL EXHIBIT OF NATURE PHOTOGRAPHY AT MUSEUM

Copyright, Hobart V. Roberts

"THREE LITTLE TAILS"

By Hobart V. Roberts, Utica, N. Y. First Prize winner in Animal Life Division.

"OLD PAPER BIRCH"

By U. Stephen Johnson, Northampton, Mass. First Prize winner in Plant Life Division.

"OSORNO"

By Henry Webb Hyde, Cambridge, Mass. First Prize winner in Scenery Division.

"GANNET GROUP"

By W. A. Anderson, Toronto, Canada. One of two First Prize winners in Color Division.

Above are some of prize winners in exhibition sponsored by Nature Camera Club of Chicago. The exhibit will continue throughout February in Stanley Field Hall. Accepted for display are 172 black-and-white photographs and 450 color slides. There were 1,650 entries. (See story on page 2)

MUSEUM AGAIN HOST TO CHICAGO INTERNATIONAL EXHIBIT OF NATURE PHOTOGRAPHY, THROUGHOUT FEBRUARY

(See pictures on page 1)

The Second Chicago International Exhibition of Nature Photography is being held at the Museum, February 1 to 28 inclusive, under the auspices of the Nature Camera Club of Chicago. The top prize winners, selected from among the 172 black-and-white prints accepted for display in Stanley Field Hall, are shown on page 1 of this issue of the BULLETIN. A total of 400 black-and-white photographs was submitted.

Also accepted for display are 450 color slides from among 1,250 submitted. A part of these are shown in Stanley Field Hall by means of a special illuminated installation, which will be changed twice during the month (February 10 and 19). As they are practically all miniature in size, three screenings of them in enlarged projection have also been arranged, to be given in the Simpson Theatre at 3 P.M. on Sunday afternoons, February 2, 9, and 16. The general public is invited to attend.

Black-and-white pictures are in three divisions: Plant Life, Animal Life, and Scenery. The color slides include each of these classifications, and are grouped together as a separate fourth division. First prizes consisting of silver medals were awarded in each of the four divisions (two in the Color Division). Ribbons, other awards, and honorable mentions were given to several other entries in each division.

FOUR HUNDRED COMPETITORS

The judges were: Mr. Tappan Gregory, Chicago attorney, who has won wide acclaim in the field of wild animal photography under night-time conditions; Mr. D. Ward Pease, noted as a writer on photography; Mr. Edward Lehman, Associate, Photographic Society of America; Mr. Karl P. Schmidt, the Museum's Chief Curator of Zoology, and Dr. Earl E. Sherff, Research Associate in Systematic Botany at the Museum.

The entries, aggregating a total of 1,650 with the inclusion of both prints and color slides, were submitted by 400 competitors in 37 states, Alaska, Hawaii, and the following foreign countries: England, Scotland, Canada, Australia, Mexico and Hungary.

An illustrated catalog of the exhibit has been published by the Nature Camera Club of Chicago, and will be available at nominal cost, either from the Museum or the secretary of the club, Miss Louise K. Broman, 6058 South Troy Street, Chicago 29, shortly after the close of the exhibition.

The Nature Camera Club of Chicago, co-sponsor of the exhibition, is a member of the Chicago Area Camera Clubs Association, which is an affiliate of the Photographic Society of America. Mr. Ben Hallberg is president of the club for 1947, and Mr. H. J. Johnson, A.S.P.A., is chairman of the exhibition committee.

ANOTHER EXHIBIT PLANNED

Although this exhibit is the Second International Nature salon, as such, it is the third event of its kind in the Museum, as the institution conducted a competition and exhibition, "Lenses on Nature," as a feature of the 50th anniversary celebration in 1943.

It is planned to conduct a Third International, with entries beginning in 1947, and exhibition scheduled for the early part of 1948. These contests have proved to be mutually beneficial to those interested in amateur photography and to the Museum, and it is believed they do much to encourage and promote interest in nature and science.

"CECROPIA LARVA"

By Louis Quitt,
Buffalo, N. Y.
One of two
First Prize winners
in Color Division.

5 SILVER MEDAL WINNERS

Louis Quitt, Buffalo, N. Y., *Cecropia Larva*

W. A. Anderson, Toronto, Canada, *Gannet Group*

Hobart V. Roberts, Utica, N. Y., *Three Little Tails*

U. Stephen Johnson, Northampton, Mass., *Old Paper Birch*

Henry Webb Hyde, Cambridge, Mass., *Osorno*

30 HONORABLE MENTION AWARDS

Therese Whiteside, Big Sur, Calif., *Yucca;* **R. B. Horner**, 846 Bradley Place, Chicago, *Spanish Bayonet;* **Karl E. Hoffman**, San Carlos, Calif., *Concord Grapes;* **D. C. Gutleben**, San Francisco, *Jasper Sheep;* **Bernard W. Baker**, Marne, Mich., *Redheaded Woodpecker;* **Norbert Husting**, Milwaukee, *Mammoth Hot Springs;* **Richard F. Lederhaus**, Buffalo, N. Y., *Frosted Trees;* **Helen C. Manzer**, New York City, *Rock Crop;* **H. M. Hickok**, Sierra Madre, Calif., *Blakesly Botanic Garden;* **Bertha S. Townsend**, Johnstown, Pa., *Spider and Web;* **Jay T. Fox**, Seaford, L. I., N. Y., *Opossum Young in Pouch;* **E. B. Curtis**, Verona, N. J., *South Mt. Reservation;* **Maj. F. W. Chesrow**, 35 West Jackson Boulevard, Chicago, *Nature's Fury;* **Edward A. Hill**, Fleetwood, Pa., *Humming Bird at Home;* **Lucille Babbit**, Washington, D. C., *Bridal Veil Falls;* **D. C. Morgenson**, Yosemite National Park, Calif., *Dwarf Bilberry;* **John Warth**, Spokane, Wash., *Mountain Goat at Home;* **Clifford Matteson**, Buffalo, N. Y., *Frosted;* **Douglas S. Rowley**, Long Meadow, Mass., *Reflections of an Old Timer;* **Albert E. Graf**, Portsmouth, Ohio, *Gull in Flight;* **Mrs. Grace Ballentine**, Upper Montclair, N. J., *"Rhythm" Porpoise;* **F. V. Sampson**, Barstow, Calif., *Big Ears;* **Dr. R. R. LaPelle**, Philadelphia, Pa., *One's, Two's, and Three's;* **Ben Hallberg**, Brookfield, Ill., *Desert Flower;* **H. J. Ensenberger**, Bloomington, Ill., *Milkweed Seed;* **Roy A. Whipple**, 66 West Ohio Street, Chicago, *Golden Aspen;* **Otho B. Turbyfill**, 1632 East 84th Place, Chicago, *Dune Feathers;* **Clifford Matteson**, Buffalo, N. Y., *Winter Idyll;* **Emil Pearson**, Red Granite, Wis., *Aurora Borealis;* **Helen C. Manzer**, New York City, *Bridal Veil.*

An inscribed stone ax of diorite in Case 14, Hall 8 presents a problem for Central American archaeologists, because its Mayan hieroglyphics are as yet undeciphered. The ax, which was part of the votive cache underneath a temple, was found in British Honduras by a Museum expedition.

PERUVIAN ARCHAEOLOGICAL EXPEDITION RETURNS; 1,500 YEARS OF HISTORY UNCOVERED

By DONALD COLLIER

CURATOR OF SOUTH AMERICAN ARCHAEOLOGY AND ETHNOLOGY

The Chicago Natural History Museum 1946 Archaeological Expedition to Peru returned to the Museum late in December. Under the leadership of the writer, the expedition completed six months of exploration and excavations in the Viru Valley on the north coast of Peru.

CLEARING GATEWAY OF CHIMU

How brush and earth were removed to uncover part of Inca town, preparatory to searching for dump heap.

The expedition co-operated in the field with six archaeologists from Yale and Columbia universities, the American Museum of Natural History, and the Smithsonian Institution. The aim of that co-operation was to make an intensive study of a single coastal valley in order to learn as much as possible about the history of the local civilizations from the time of earliest human occupancy of the region until the present day. Such an intensive investigation had never before been attempted in Peru, or in any other part of South America.

The co-operative aspects of the work were carried out under the auspices of the Institute of Andean Research, of which the writer is a member. With a grant from the Viking Fund, the Institute was able to furnish such service features as jeeps for transportation, air maps, and a field laboratory where specimens were washed, mended and catalogued. The work of the writer was greatly facilitated by these aids.

THOUSAND PREHISTORIC SITES

The Viru Valley is one of the smaller of the Peruvian coastal valleys, and was chosen as a place to work for that reason. The portion of the valley of archaeological importance is an area approximately six by twenty miles. It might be supposed that this confined area would be too crowded with seven archaeologists at work, but this was not the case. The valley contains more than a thousand prehistoric sites, such as temples, fortresses, cemeteries and dwelling places. It was possible to study only a third of the existing sites and to excavate a much smaller number.

Basic to all interpretive and historical studies of an archaeological region is the establishment of a chronology, that is, a time sequence of cultural periods or epochs into which archaeologists can fit their finds. Without chronology, archaeology is speculative and to a great extent meaningless. The work of the writer in the Viru Valley was directed toward gathering evidence which would make possible the building of a temporal sequence for that valley and which would correct and amplify the general chronology already established for the north coast of Peru.

This evidence was collected by means of stratigraphic (layer by layer) digging in refuse heaps. These refuse heaps had been gradually built up through the continuous discarding of broken pots, tools, ornaments and other debris by the prehistoric inhabitants, and thus yielded evidence of the changes in everyday life through the passing centuries.

1,500-YEAR STORY IN 15 FEET

The broken white lines indicate approximately the divisions in Peruvian rubbish pile between the seven cultural periods, as follows: 1, Inca; 2, Chimu; 3, Tiahuanaco; 4, Mochica; 5, Gallinazo; 6, Salinar; 7, Cupisnique. The test pit in the floor of the trench was dug to make sure that no additional refuse lay below.

With the help of six local farmers, who soon became proficient in the precise techniques of stratigraphic digging, trenches were excavated in refuse deposits at a dozen sites in the valley. These deposits varied in thickness from three to fifteen feet, and most of them contained remains from at least two cultural periods, one lying on top of the other.

While excavating a refuse heap left by the Incas, who conquered Viru Valley about A.D. 1450, we were fortunate to encounter that rarity so dear to the archaeologist's heart—a complete stratigraphic sequence in one deposit.

SEVEN EPOCHS BARED

Beneath the Inca remains were found vestiges of the Chimu people, who were conquered by the Incas. Digging still deeper, we encountered successively refuse from the Coast Tiahuanaco, Mochica, Gallinazo, Salinar, and Cupisnique periods. We guess that the Cupisnique people lived in the early years of our era, so that when we reached the bottom of the refuse fifteen feet below the present ground surface we had dug through the evidence of nearly 1,500 years of human history.

This sequence of seven epochs included all of the known pottery-making periods on the north coast of Peru, and confirmed beyond doubt the temporal sequence which had been laboriously constructed by overlapping the excavation results from numerous refuse deposits.

During the course of the excavations the writer recovered some 25,000 potsherds (broken pieces of pottery), numerous whole and restorable pots, tools and ornaments of of stone, bone, wood and shell, and plant and animal remains which will throw much light on the prehistoric diet. This material will serve not only in establishing a chronology for the Viru Valley, but will reveal much about life during the various periods represented. And from this combined information it will be possible to date tombs and their contents, as well as temples, fortresses and other structures, and then to proceed to broader studies of the development of architectural and art styles and the growth of social and political organization. Thus the lowly refuse dump is the archaeologist's key to the cultural history of prehistoric peoples.

ANSWER TO ARCHAEOLOGIST'S PRAYER

Trench cut in stratified rubbish containing seven cultural periods. The digging crew is standing at the ten-foot level. Completed trench is shown in second column.

When the collection reaches the Museum, the specimens will be classified and analyzed and a report will be prepared for publication by the Museum.

JAPANESE CYCADS, 'LIVING FOSSILS,' PORTRAYED IN MURAL

By THEODOR JUST
CHIEF CURATOR, DEPARTMENT OF BOTANY

The mural, portraying "Cycads in a Temple Garden," recently installed in Hall 29 (Plant Life) shows the largest cycads known to grow in Japan. These plants adorn the garden of the Ryugeji Temple in Shimizu near Fjiri, Shizouka prefecture, roughly 120 miles west of Tokyo. The largest tree near the road is more than 25 feet tall, and its basal diameter is five feet. Its erect and unbranched habit is characteristic of this cycad, while the branched trunks seen in the background are the result of injury induced during early growth.

CYCADS IN A TEMPLE GARDEN, SHIMIZU, JAPAN

Painting by Staff Artist Arthur G. Rueckert in Martin A. and Carrie Ryerson Hall of Plant Life (Hall 29). Adapted from a drawing published in "American Fossil Cycads" (1906) by G. R. Wieland.

This species of cycad is known by the scientific name *Cycas revoluta*. It grows wild in southeastern Asia as far north as southern Japan, where the erect plants are called "tessio" or "sotetsu" and the branched ones "hoso." By many this cycad is regarded as the most beautiful member of this family of plants, and is frequently cultivated in parks, estates, gardens and greenhouses.

Its common name is "sago palm," because its stems and seeds contain large amounts of starch. Actually it is more closely related to large tropical ferns than to palms which it resembles in general habit only. Its rigid fern-like leaves are familiar symbols of Palm Sunday and are widely used as decorations.

Although an Admiral Hutchinson of the Royal Navy introduced the plant to England in 1758, and specimens have been grown at the Royal Botanic Gardens of Kew, Surrey, since 1760, the scientific name was not published until 1784 when Thunberg's classic *Flora of Japan* appeared. It took some time before the first fruiting specimens were seen in Europe. These were observed in 1801 at Farnham Castle, Surrey, belonging to the Bishop of Winchester, and were later described and illustrated by J. E. Smith.

By comparison, this cycad seems to have been in cultivation in Japan long before it was brought to Europe. It is not surprising, therefore, that the skill of Japanese gardeners should have produced striking horticultural variations. One of these forms is known as "shishi" or "lion's-head variety." Its habit is so different from the normal erect plants that it has been likened to some of the fossil relatives of the living cycads which were low-growing and compact plants. Shishi plants are purposely dwarfed and may have as many as twenty closely aggregated crowns of leaves. Despite their low height these specimens may be several hundred years old.

Another horticultural form is known as "hoso" or "tree-formed palm." It branches more diffusely and may produce as many as fifteen distinct crowns of leaves. In cultivation, plants of this species may be induced to branch, but rarely will they develop as many as three branches, each with its crown of leaves.

Attempts to estimate the age of cycads invariably lead to difficulty. Depending on local climatic conditions, crowns of leaves may last from one to several years. The armor of leaf bases left after the leaves drop off thus furnishes only an indirect and not very reliable basis for age determination. Unlike woody flowering plants of temperate areas with their fairly regular annual growth rings, the cycads produce wood devoid of such dependable indicators of age. Their relatively slow growth, however, suggests considerable age as far as larger specimens are concerned.

The leaves of this cycad may be more than two feet long and bear numerous small leaflets, giving them a palm-like or fern-like appearance. The leathery texture of the leaves keeps them fresh for a long time, thus retaining their green color as decorations.

Often specimens grown in greenhouses produce remarkable coralloid masses on their roots above ground. These distorted structures contain at their tips bacteria which intensify the distortion of the roots and prepare the way for the entry of another micro-organism, a blue-green alga. The latter multiplies profusely and forms a zone of easily visible growth below the outer layers, if one takes the trouble to section such a tubercle. This type of root growing upward, unlike the regular roots, occurs in all cycads, although it is more readily seen in plants grown in greenhouses than outdoors.

An outstanding feature of all cycads is the absolute separation of the sexes on different specimens of the same species. Generally the reproductive structures of cycads are grouped together either loosely as in this species or in a more compact form ordinarily referred to as cones or strobili. In *Cycas revoluta*, the female reproductive leaves look somewhat like smaller editions of the real leaves, bearing usually three pairs of ovules below the leafy portion. These so-called sporophylls are found at the tip of the plant and are spirally arranged like the regular leaves forming the crown below them.

This condition of loosely arranged sporophylls is regarded as the most primitive arrangement from which various stages of reduction of the leafy parts lead to the compact type of cone found in the male plants of this species as well as most of the other members of the family. Although at the beginning the female cones of *Cycas revoluta* are covered by yellowish hairs, these disappear gradually and the seeds have a soft orange-red color.

Other members of this family of "living fossils" which has come down to us almost unchanged for about a hundred million years are low-growing like their fossil relatives or even larger than those illustrated in this mural. Though more widely distributed in the past, they are today confined to subtropical and tropical regions except for the genus Cycas in Asia and the American genus Zamia which reaches southern Florida. Their present distribution and greatest concentration may be seen in Mexico and the West Indies in the Western Hemisphere and

in Australia and South Africa in the Eastern and Southern Hemispheres.

Commonly they grow in remote places and often are quite local in their distribution. The great hardiness of the sago palm insures its popularity for outdoor planting in such areas as southern California, the Gulf of Mexico and the Mediterranean region.

Many remarkable specimens representing the nine genera of this unusual family of plants have been collected or received from abroad by the late Professor Charles Joseph Chamberlain, of the University of Chicago and a Research Associate of this Museum, and can still be seen in the greenhouses of the University of Chicago.

Professor Chamberlain devoted the greater part of his lifetime to the study and collection of these plants and is readily recognized as the greatest authority on this group. The Museum was fortunate to receive his valuable photographs, herbarium and slides assembled during his extensive travels in quest of the cycads or at home in his laboratory and greenhouses.

MUSEUM MEN PARTICIPATE IN EVOLUTION SYMPOSIUM

Three of Chicago Natural History Museum's four departments were represented at an important symposium on "Common Problems of Genetics, Paleontology, and Evolution," held at Princeton University January 3 to 5.

The Department of Botany was represented by Dr. Theodor Just, Chief Curator; Geology by Mr. Bryan Patterson, Curator of Paleontology, and Zoology by Chief Curator Karl P. Schmidt and D. Dwight Davis, Curator of Anatomy.

The conference was one of several sponsored by Princeton, in connection with its year of bicentennial celebration, to consider problems of major humanistic and scientific importance. Sixty selected participants, including five outstanding biologists from the British Isles, spent three days in formal meeting and informal discussion.

MYSTERIES REMAIN

The theory of evolution is the only great generalization, comparable to the atomic theory in the field of physics, that has come from biological studies. The fact of evolution has long been accepted by every biologist, but the way in which it occurred and the mechanism by which it was brought about are still imperfectly understood. Students of heredity have discovered that localized ultramicroscopic substances called *genes* determine the similarities and the differences between animals, and thus are the basis of all evolutionary change. But this is only half the story.

The question of how gene changes (called *mutations*) are translated into the evolution that has taken place in plants and animals, and specifically how the exact adjustments of living organisms to their environment have arisen, is still unanswered despite a tremendous amount of study. This is the most important biological problem today.

The question of how evolution has operated is being attacked from two different standpoints: experimentation and observation. Neither of these alone could supply an answer, and the work has been largely divided between university laboratories and the laboratories of natural history museums. Most of the experimental work is being done in university laboratories, in the fields of genetics and experimental embryology. Natural history museums, because of their vast collections of specimens, have provided most of the observational data.

Fossils not only prove that evolution went on in the past, but also show how fast plants and animals actually evolved and something about the manner in which new types arose. The enormous numbers of plants and animals living today are the result of this past evolution.

The evolution of the future is taking place in the great laboratory of nature. Only a small handful of animals can be brought into the laboratory and experimented upon. One of the important functions of a museum is to test the results of such laboratory experimentation in the larger laboratory of nature, which is where evolution is actually taking place, and to work at levels where experimentation is impossible.

GENETICS TURNS TO FIELD

It is significant that evolution was not discovered in an experimental laboratory, but was suggested by the "museum" type of observational research. Now, after two generations of laboratory studies in heredity, the active branch of genetics is turning to paleontologists and naturalists for illuminating "leads," and the geneticists themselves are turning from their laboratory specimens to detailed ecological field studies.

It is this evident rapprochement between the extremely specialized field of genetics and the more general and old-fashioned fields of systematic zoology and botany that made the Princeton symposium peculiarly appropriate and timely.

The question of how evolution operates was not answered at the Princeton Conference. But the active exchange of ideas, similar to the familiar round table and panel discussions on the radio, promoted a mutual respect and understanding among those who are seeking the answer from many different angles. The results of the conference will be felt for many years in biological research.

STAFF NOTES

At the annual meeting of the Botanical Society of America, held Dec. 26–31 in Boston, Dr. Francis Drouet, Curator of Cryptogamic Botany, was elected Secretary of the Systematic Section, and Dr. Theodor Just, Chief Curator, Department of Botany, was re-elected Secretary of the Paleobotanical Section and reappointed Chairman of the Committee on Paleobotanical Nomenclature. . . . . Mr. Karl P. Schmidt, Chief Curator, Department of Zoology, recently presented a radio broadcast, "Come and See the Museum," in the *Make Them Look Alive* series on science for the Chicago Public Schools over stations WIND and WBEZ.

MUSEUM ANTHROPOLOGISTS AT AAA MEETING

On December 27–31, Chicago Natural History Museum, the University of Chicago, and Northwestern University acted as joint hosts at the forty-fifth annual meetings of the American Anthropological Association and its affiliated societies. The meetings, held in the Palmer House, were the first since the beginning of the war.

The principal feature consisted of a number of symposia organized around certain outstanding interests in American anthropology today. One symposium was devoted to the present status and inter-relations of the several fields of anthropology. Another was concerned with the progress of African anthropology. A third centered on the need for river valley archaeology in the United States, with particular reference to valley areas where archaeological sites will be inundated or destroyed consequent to the completion of proposed river control projects.

One of the most significant of these symposia was concerned with recently found remains of giant types of early man in Java and China, and the problems involved in the interpretation of these remains. Finally, the growing importance of anthropology in matters of practical concern was reflected in two sessions on applied anthropology—one on military government in the Pacific, and a second on the work of anthropologists in the field of human relations in industry.

Two members of the staff of this Museum presented papers at the meeting. Dr. Wilfrid D. Hambly, Curator of African Ethnology, read "Visual Aids to Teaching African Anthropology," a report on research undertaken on behalf of the Committee on African Anthropology, National Research Council. Dr. Alexander Spoehr, Curator of Oceanic Ethnology, presented "Changing Kinship Systems." Mr. George Quimby, Curator of Exhibits, was a member of the Chicago committee on arrangements.

A large number of those attending found time to visit the Museum and to inspect the Anthropology Department's most recent exhibits—those in Hall B (Archaeology of the New World).

Chicago Natural History Museum

FOUNDED BY MARSHALL FIELD, 1893

Roosevelt Road and Lake Shore Drive, Chicago

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Members are requested to inform the Museum promptly of changes of address.

Nature in Action . . . .

ALBINOS

BY EDWIN WAY TEALE

In a glass case at the Chicago Natural History Museum, after my lecture [*Mr. Teale lectured here last March 23*] I was shown a remarkable exhibit of albino birds and animals. There I saw a bluejay that wasn't blue, a brown thrasher that wasn't brown, a crow that wasn't black. All were snow white. There I saw a pure white English sparrow. Even its bill was the color of white-wash. There I saw a flicker, completely white except for a startling blood red crescent on the back of its head. And there, also, I saw an albino woodchuck and an opossum and a skunk that had fur as white as that of an ermine.

In every instance the creature had lacked the ability to produce pigments within its system to a more or less marked degree. There are albinos among plants as well as among animals. Snow-white lobsters, frogs, peacocks, cattle have been reported. Among humans, it is estimated that the frequency of the occurrence of albinism is about one in 10,000. The highest rate of frequency is said to be found among the Indians of Arizona and Mexico. The reason the eyes of albinos are pink is that the red blood circulating through the back of the eye is seen through the transparent tissues in front.

Among wild creatures, albinos often have an unearthly beauty. Unfortunately, it is also often a fatal beauty. Hawks and other predators see them more easily. They lack the camouflage that saves the lives of normally colored birds and animals. Their strange beauty is also a kind of curse that ostracizes them from their kind. A flock of birds will sometimes set upon an albino or a partial albino member of the group and drive it away. Such birds usually have difficulty in finding mates.

A few years ago, a redwing blackbird appeared in a swamp with which I am familiar. Almost half the feathers of one wing were white. It was a marked bird. I used to see it calling from the top of a weeping willow tree, engaging in aerial battles with other males for the defense of its territory, darting after crows or herons that flew too close. It stood out among the other birds for its dash and vitality and courage as well as for its half white wing. Yet it never seemed to get a mate. Before the summer was over, it disappeared. I never saw it again.

(The above is a syndicated article of The George Matthew Adams Service, reproduced by permission of the author.)

MUSEUM OFFICERS RE-ELECTED

Mr. Stanley Field was re-elected President of Chicago Natural History Museum for his thirty-ninth consecutive one-year term, at the Annual Meeting of the institution's Board of Trustees, held January 20.

All other officers who served in 1946 were re-elected. They are: Mr. Marshall Field, Chicago publisher, First Vice-President; Mr. Albert B. Dick, Jr., Second Vice-President; Mr. Samuel Insull, Jr., Third Vice-President; Colonel Clifford C. Gregg, Director and Secretary; Mr. Solomon A. Smith, Treasurer, and Mr. John R. Millar, Assistant Secretary.

1946 ATTENDANCE UP

The counters in the hands of the entrance guards at the Museum clicked for 1,287,436 visitors during 1946. This was a large increase over attendance in 1945 when the number of visitors was 1,070,678. It is believed attendance would have been considerably larger had it not been for the two coal strike dimouts which reduced Museum visiting hours temporarily, and for the prolonged bus strike which cut off the transportation facilities of many potential Museum visitors.

Only 127,305, or less than 10 per cent of the total, paid admission; more than 90 per cent came on the free days, Thursdays, Saturdays and Sundays, or belonged to classifications admitted free every day—Museum members, children, teachers, students, and military personnel in uniform.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

A Naturalist in Cuba. By Thomas Barbour. Little, Brown, and Co., Boston. $3.

The late Dr. Barbour's host of friends rejoice in the memorial of his naturalist's life left in his volumes of reminiscence and travel. He dedicated his book on Cuba specifically as a tribute to commemorate his friendship and admiration for the naturalists of that island. It forms also a most satisfactory memorial record of a lifelong love of an island.

The generous stack of papers on the West Indian fauna that came to my own desk as a gift from Dr. Barbour thirty years ago introduced me at once to the charm of the West Indies, and to the stimulus provided by one's personal library for a field of specialization.

The personal tone of Dr. Barbour's book, and the constant reference to the background of personalities that forms so pervasive an aura of interest to the other practitioners of descriptive zoology, is peculiarly sympathetic. He had a vast fund of anecdote about the development of the important Harvard Botanical Station, about the bird collecting that accumulated the great collection in the Museum of Comparative Zoology, about the fascinating anoles and snakes and froglets and shield-headed toads, about the mammals, both living and extinct, and about the adventures of cave hunting.

A Naturalist in Cuba thus happily combines the interest of naturalist and historian, and forms a thoroughly satisfactory introduction to the plant and animal life of Cuba, to the problems of island life, and to the great tropical island to which citizens of the United States are perhaps even more closely and multifariously tied than to our own island outposts in the Caribbean.

KARL P. SCHMIDT, *Chief Curator, Zoology, and Associate Editor of Copeia.*

Technical Publications Issued

The following technical publications were issued by Chicago Natural History Museum Press recently:

Fieldiana—Anthropology, Vol. 36, No. 2. *Toggle Harpoon Heads from the Aleutian Islands.* By George I. Quimby. December 31, 1946. 9 pages, 9 text figures. $0.35.

Zoological Series, Vol. 25, Part 3. *A Bibliography of Birds.* By Reuben Myron Strong. December 24, 1946. 528 pages.

THE MUSEUM AS CUSTODIAN OF PACIFIC CULTURES

By ALEXANDER SPOEHR
CURATOR OF OCEANIC ETHNOLOGY

Excluding Malaysia and Australia, the islands of the South and Central Pacific are divided into three main groups—Polynesia, Micronesia, and Melanesia.

The Polynesian area is roughly triangular in shape, with Hawaii, New Zealand, and Easter Island at the corners of the triangle.

Micronesia encompasses the islands of the Central Pacific, north of the equator, from the Palaus to the Marshalls.

Melanesia takes in New Guinea and the islands east and southeast as far as Fiji.

This division is based partly on the physiography of the islands, partly on the racial characteristics of the inhabitants, and partly on their culture. The "Southwest Pacific," as it was used in wartime communiqués, referred to Melanesia—the island area populated by Oceanic Negroes.

SOUTH SEA EFFIGY
(Hall A, Case 63)

In the years before World War I, German museums made great efforts to obtain ethnological collections from what were then German colonies in the Southwest Pacific. In particular, the Museum für Völkerkunde in Hamburg acquired one of the finest collections in the world from the Oceanic Negroes living on the islands of Melanesia.

CHICAGO COLLECTION UNCHALLENGED

The German museums suffered extensive damage in World War II, however. Full details are not yet available, but recent reports indicate that 90 per cent of the famous South Sea collection of the Hamburg Museum für Völkerkunde was destroyed. Probably the finest collection that remains in the world is that in Chicago Natural History Museum's Joseph N. Field Hall (Hall A).

This Melanesian collection of outstanding excellence was acquired primarily between 1905 and 1913, a period when great efforts were being made to build up the anthropological materials in the Museum. Many specimens were purchased from private collectors, but by far the largest and best documented increment was obtained through the efforts of the late Dr. Albert B. Lewis, Curator of Melanesian Ethnology, on the Joseph N. Field Expedition to the South Pacific during the period 1909–1913.

Dr. Lewis spent five strenuous years in the field, and despite the handicap of severe illness contracted on the malignant coasts of New Guinea, pursued his collecting and research with enthusiasm and vigor. Including his collection, the Museum has 22,000 specimens from Melanesia.

It is fair to ask, "What use is this collection? Why go to such effort and expense to obtain strange articles made by far-off peoples who have played a minor role in shaping present world affairs?"

The answer is to be found in the point of view of anthropology toward its subject matter—man. Anthropology is interested in man as a whole, not in any particular group of men alone. One of its distinguishing characteristics is its attempt to obtain the broadest comparative basis possible in examining man and his culture.

PART OF CULTURE JIGSAW

The anthropologist is interested in man at all times, in all places. In pursuing this interest, he has built up an outline of human history—sketchy in places, to be true—from earliest to recent times. He has blocked out the living races of the earth and described the great variety of cultures they possess. It is in this comparative study that the Museum's Melanesian collection assumes its importance.

The cultures of Melanesia, as seen in the series of tools, utensils, weapons, and objects of art, ritual, and ceremony, represent a part of the comparative base from which anthropology draws its conclusions.

Furthermore, cultures are constantly changing. At the time this collection was made, the native cultures were very different from what they are today. Indeed, they have been so modified in recent years through contact with the white man that in their strictly aboriginal form they exist only in a few places.

Thus the collection assumes an added significance. It cannot now be duplicated—it preserves a unique expression of man's culture, as found at a particular point of time in the Southwest Pacific.

The Museum also possesses representative collections from Polynesia and Micronesia, on display in Hall F. The remaining Pacific Island area—Malaysia—is represented in Halls H and G.

HOW MINERALS ARE CLASSIFIED DISCLOSED IN EXHIBIT

By SHARAT K. ROY
CHIEF CURATOR, DEPARTMENT OF GEOLOGY

In keeping with the policy adopted in recent years of providing introductory exhibits that will lead to proper appreciation of each subject as a whole, a new exhibit, "The Classification of Minerals," has been added to the Museum's geological exhibits. It has been placed in Hall 34, alongside its companion case, "Physical Properties of Minerals."

The new exhibit aims to furnish an adequate introduction to mineralogy and provide a remedy for the complaint heard against museums that they overlook the need of supplying exhibits that equip a visitor with necessary background for further study of the subject.

Minerals may be classified in several ways, nearly all of which are dependent, however, on their chemical composition or the forms of their crystals, although some prefer the economic classification. By this, the minerals are first grouped according to the useful element or groups of elements contained in them, then are divided on the basis of similarity in chemical properties.

BASED CHIEFLY ON CHEMISTRY

The classification shown in the Museum exhibit is based upon chemical composition, and follows that used in the latest edition of *Dana's System of Mineralogy*. Crystallographic and physical relationships are taken into consideration in breaking down *classes* and *families* into *groups*, *species* and *varieties*. Minerals with the simplest composition such as gold, silver and diamond are considered first, while those of the greatest complexities such as feldspars, micas and garnets are placed last.

In recent years, X-ray studies of crystals to determine their internal structure have made great strides, and the true nature of this structure has been recognized. The fundamental fact discovered concerning crystals is that the atoms of which they are composed are arranged in an orderly fashion, forming a three-dimensional pattern. The pattern varies, depending on the crystal, and determines the class to which the crystal belongs.

The knowledge of the internal structure of minerals thus has led to a marked departure from conventional mineral classifications. Minerals that were formerly grouped under a certain class, because of this similar chemical composition, have now been placed in an entirely different class. To cite an example: The quartz group of minerals which are oxides were heretofore grouped with the oxides, but they are now classed with the silicates because X-ray studies have shown that, structurally, quartz bears a closer resemblance to the silicates. Doubtless, with the increased knowledge of the internal structure of minerals, there will be further changes in the classifications.

In the space available in the case used for this exhibit, only a relatively small number of minerals can be exhibited. It has thus been impracticable to represent a family or a group of minerals by all of its valid members. Often important members have been omitted.

PATH TO DETAILED STUDY

Those interested in a more detailed study are referred to the specimens displayed in the adjacent cases. In them will be found most of the known minerals, which number considerably more than 1,000 species.

The exhibit was prepared by Assistant Curator Harry Changnon and Mr. Henry Horback, Assistant in the Department.

SATURDAY AFTERNOON LECTURES TO BEGIN MARCH 1

The Spring Course of Illustrated Lectures on Science and Travel for adults will be presented on the nine Saturday afternoons in March and April. The lectures are accompanied by motion pictures in color and will be given in the James Simpson Theatre of the Museum. All will begin at 2:30 P.M.

First lecture, on March 1, will be "Through Khyber Pass—History's Oldest Funnel," and the lecturer will be Deane Dickason, noted journalist, Far East authority and film director. The second lecture, March 8, will be "Bird Magic in Mexico," by Dr. Olin Sewall Pettingill, Jr., of the faculty of Carleton College, Northfield, Minnesota.

A complete schedule of the entire nine lectures will appear in the next issue of the BULLETIN.

No tickets are necessary for admission to these lectures. A section of the Theatre is reserved for Members of the Museum, each of whom is entitled to two reserved seats. Requests for these seats should be made in advance by telephone (WABash 9410) or in writing, and seats will be held in the Member's name until 2:30 o'clock.

CHILDREN'S ENTERTAINMENTS ON SATURDAY MORNINGS

The James Nelson and Anna Louise Raymond Foundation will open its spring series of free entertainments for children on Saturday mornings with "Fishing In A Big Way," a color motion picture showing a salmon run; also lobster fishing off Nova Scotia. This program will be given on March 1, and will be rounded out with an animated cartoon. On March 8 the program will be "The Story of Reptiles" told by Mr. Jack Raymon, Director of the Kentucky Reptile Garden, who will appear in person. Mr. Raymon will demonstrate his subject with living specimens of snakes, as well as with charts and other material.

Seven other programs will be given on Saturday mornings throughout March and April; a complete schedule of these will appear in the next issue of the BULLETIN.

All programs begin at 10:30 A.M. and are presented in the James Simpson Theatre of the Museum. No tickets are necessary. Children may come alone, accompanied by adults, or in groups.

Sunday Layman Lectures Suspended Until March

Because of out-of-town lecture engagements during February, Mr. Paul G. Dallwig, the Layman Lecturer, will not appear at the Museum on Sundays during that month, but he will resume his lectures, both morning and afternoon, on March 2, and thereafter will appear each Sunday through May 25 inclusive.

In March, Mr. Dallwig's subjects will be: Mornings, 11:30 each Sunday, "The Romance of Our American Forests"; afternoons, 2:30, "Miracles in Wood." Reservations for each date—March 2, 9, 16, 23, and 30—will be accepted by mail or telephone (WABash 9410) throughout February. Advance reservations are necessary for all of the Layman Lectures, because of the heavy demand and the necessity of limiting the size of each audience.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Charles Albee Howe, Homewood, Ill.—13 color prints of modern Mexico.

Department of Botany:

From: Estate of Hermann C. Benke, Chicago—100 herbarium specimens, Indiana and Illinois; Donald Richards, Chicago—350 specimens of mosses, Bryothece Iberica; Dr. Harry K. Phinney, Chicago—126 specimens of algae, Connecticut; Dr. Frances E. Wynne, Chicago—51 specimens of mosses; Bill Bauer, Webster Groves, Mo.—41 herbarium specimens, Missouri.

Department of Geology:

From: C. M. Barber, Hot Springs, Ark.—a collection of fossil fish, turtles, and reptiles, Arkansas; Dr. Rainer Zangerl, Chicago—12 specimens of fossil fish and fossil turtles, Wyoming; Frank Derrick, Washington County, Tex.—cast of maxillary of *Caenopus;* Dr. Mark Francis—casts of three fossil specimens; Dr. David Dunkel, Washington, D.C.—20 specimens of fossil fish fragments, Missouri; C. A. Goodell, Albuquerque, N. Mex.—6 official Army photographs of the explosion of the first atomic bomb; T. R. Lambert, Chicago—upper and lower third molar of *Mammuthus primigenius* Blum, Alaska; Dr. Heinz A. Lowenstamm, Urbana, Ill.—portion of carapace of *Terrapene* cf. *ornata* (Agassiz), Arkansas; Richard Charles King, Colorado Springs, Colo.—a specimen of green quartzite, Colorado.

Department of Zoology:

From: Robert Weber, Highland Park, Ill.—10 mammal skeletons, Illinois; Armando Velo, Highland Park, Ill.—a mink skeleton, Illinois; Ross Allen, Silver Springs, Fla.—79 turtles, Florida; Chicago Zoological Society, Brookfield, Ill.—a lizard and 29 snakes, South America; S. G. Jewett, Jr., Portland, Ore.—4 mammal specimens, Dutch New Guinea; Lincoln Park Zoo, Chicago—a mammal specimen and 4 grizzly bear cubs; John G. Shedd Aquarium, Chicago—an electric eel, South America; Cyril F. dos Passos, Mendham, N. J.—39 butterflies (all paratypes of 23 species and varieties), North America.

Library:

From: Boardman Conover, Chicago; Dr. Henry Field, Cuernavaca, Mexico; Henry W. Nichols, Chicago; and Miss Miriam Shaw, Harvard, Mass.

PROGRAM OF LECTURE TOURS FOR WEEKDAYS IN FEBRUARY

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays; a schedule of these follows:

Wed., Feb. 5—Chicago, Millions of Years Ago (*Winona Hinkley*).

Fri., Feb. 7—Reptiles Through The Ages (*Lorain Farmer*).

Wed., Feb. 12—The Adventures of Carl Akeley (*June Ruzicka*).

Fri., Feb. 14—Exotic and Unusual Flowers (*Marie Svoboda*).

Wed., Feb. 19—Readin', 'Ritin', and 'Rithmetic—Early Ways of Writing and Counting (*Roberta Cramer*).

Fri., Feb. 21—The Magic of Jade (*Miriam Wood*).

Wed., Feb. 26—Animal Menus (*Lorain Farmer*).

Fri., Feb. 28—The First Apartment Dwellers—Pueblo Indians (*June Ruzicka*).

Museum Contributor Elected

Dr. Maurice L. Richardson, of Edward W. Sparrow Hospital, Lansing, Michigan, until recently a Non-Resident Life Member of the Museum, has been elected to the roll of the Museum's Contributors in recognition of his generous gifts of funds to the institution.

NEW MEMBERS

The following persons became Members of the Museum during the period from December 16 to January 15:

Associate Members

Michael Green, Stanley G. Harris, Carl Holzheimer, John Jirgal, Leo Mayer, Ramond Silverstein, Leo G. Warsh.

Sustaining Members

Albert L. Raymond, Morton M. Weil

Annual Members

Bertram W. Bennett, Philip Bernstein, Mrs. James Burton Braun, Mrs. Walter D. Draper, Robert Eirinberg, Max Fuhrer, Augustus J. Frank, M. J. Gale, Edward R. Glick, Mrs. C. Edward Gluesing, D. S. Haigh, Mrs. James J. Haines, William H. Harding, Mrs. Carter H. Hathaway, Mrs. Otto H. Hedrich, Mrs. Murray D. Hetherington, Robert E. Hirtenstein, H. H. Hoben, Max Hoefer, Dr. Ned U. Hohman, Herzl W. Honor, Mrs. Walter Clyde Jones, Frank P. Keeney, Wentworth Park Mackenzie, Mrs. Herbert S. Manning, N. J. McCurdie, Leo H. Milles, Harvey W. Olsen, Dr. John Chester Ross, Ralph E. Schuetz, H. S. Smith, Harry E. Smith, Jr., Monroe A. Smith, Jr., Hubert F. Townsend, Morton Weinress.

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Chicago Natural History Museum

BULLETIN

Formerly Field Museum News

Published Monthly for the Museum's Membership

Vol. 18 MARCH, 1947 No. 3

SATURDAY AFTERNOON LECTURES SCHEDULED THROUGHOUT MARCH AND APRIL

The earth—from India to Mexico, from Greenland to China, from the Mississippi Delta to Australia—will be covered in the Spring Course of Free Saturday Afternoon Lectures illustrated with colored motion pictures. The series opens at the Museum on March 1, and will continue through the last Saturday in April.

The nine lectures, for which outstanding speakers have been engaged, will be given at 2:30 P.M. each Saturday in the James Simpson Theatre of the Museum during the two months' season. They are restricted to adults—special motion picture programs for children will be given concurrently on Saturday mornings during the same months under the auspices of the James Nelson and Anna Louise Raymond Foundation (*see page 5 for children's programs*).

The dates, subjects, and lecturers booked for the spring course are as follows:

March 1—THROUGH KHYBER PASS

Deane Dickason

"There is no India," according to Mr. Dickason, noted Far East authority, who recently returned from eight months in that discontented land. What he means, he will tell in this lecture. Khyber Pass, the high back door to India which is the principal scene of his present narrative and color films, he describes as "history's oldest funnel." Mr. Dickason has had a long career as a journalist and foreign correspondent, and is the author of "Wondrous Angkor" and "Far Harbors." He is noted as the director of such well-known motion picture successes as "Virgins of Bali," "Down Singapore Way," and "Beautiful Bali."

March 8—BIRD MAGIC IN MEXICO

Olin Sewall Pettingill, Jr.

Dr. Pettingill, a co-leader of the Cornell University–Carleton College Expedition to the hill country of southwestern Tamaulipas, tells the story of this expedition in his lecture. He found that "Mexican birds are among the most beautiful in the world. There is something akin to magic in the way their bright colors and strange shapes harmonize with the exotic land in which they live." For two months the members of the expedition studied bird life, contending with the adversities of a tropical environment—intense heat and humidity, impenetrable thickets, and noxious insects—to gather information on habits and behavior. It was exacting work. But it was exciting, too, with parrots screeching and chattering, and with countless flashes of dazzling orioles, hummingbirds, trogons, and cotingas. Dr. Pettingill used thousands of feet of film in photographing birds, some never before seen through the lens of a camera.

FAMOUS RAINBOW NATURAL BRIDGE IN UTAH

From Alfred M. Bailey's "Mormon Land" pictures for March 29 lecture

March 15—GREENLAND

Commander Donald B. MacMillan

Leader of twenty-five expeditions to the Arctic—two of them sponsored by Chicago Natural History Museum—Commander MacMillan presents a lecture both new and timely. Greenland, the world's largest island, has been brought closely into the orbit of the United States by World War II. In his color films, Commander MacMillan brings intimate views of the life of this little-known northern neighbor which was host for several years to thousands of men of the United States armed forces. "Whether we keep Greenland as part of our defense system or merely maintain closer commercial ties, this great island continent is a part of us and we should know it well," says Commander MacMillan. No one is better able to tell of it than he, who is familiar not only with its geography and its resources, but also its people, the Eskimos. He has covered it from top to bottom by ship, dog-team and plane, and has very recently flown over it several times. In the last thirty-seven years, twelve of his Arctic trips have been solely to Greenland. On one trip he stayed there four years.

(*Continued on page 2*)

SATURDAY LECTURES

(*Continued from page 1*)

March 22—Sheep, Stars, and Solitude

Francis R. Line

This is the epic film story of a segment of American life. Each year several hundreds of thousands of sheep are driven from their winter pastures in the Salt River Valley of central Arizona far north to the summer grazing lands in the high forests. It is a forty-day trek through a wilderness of desert, cactus, mountains, ravines, and forests. Mr. Line accompanied one herd of sheep on this journey, hiking the entire distance in order to film this little-known phase of American life. The sheep were in charge of Rosalio, a Mexican herder, and Pablo, the camp cook. All camping supplies were carried on the backs of ten burrows. The whole film unfolds as one continuous and exciting adventure story.

March 29—Mormon Land

Alfred M. Bailey

Mr. Bailey, once a member of the Chicago Natural History Museum's staff and now Director of the Colorado Museum of Natural History in Denver, in his new all-color film of Utah's scenic wonderland portrays the land of the Mormons from the shores of Great Salt Lake to the Arizona boundary. The route traveled by the Colorado Museum expedition was along that of Padre Excalante, the first white man to explore Utah, and the sequences briefly show the work of the Mormons in changing the desert to an inland paradise. Fillmore, the first capital, Great Salt Lake, Bear River with its teeming bird life, and deer and other forms of animal life with a background of the unrivalled Zion and Bryce canyons are among the spectacular shots included in the first part of the film. The second portion is devoted to a desert river trip by boat down the canyon of the San Juan to the Colorado River, and thence to Lee's Ferry—shooting rapids, and visiting the historic Rainbow Bridge and the Crossing of the Fathers. The film concludes with a visit to unforgettable Monument Valley—with exceptional shots of the Navajos in their desert homeland. The people of Utah currently are celebrating the centennial of Brigham Young's arrival in the Salt Lake Valley.

April 5—The Great Barrier Reef

A. H. O'Connor

Mr. O'Connor is the Australian-born descendant of a California "Forty-Niner." After boyhood on a cattle ranch, where he hunted and studied the strange wild animals and birds, he joined the great gold rush in western Australia. The great Barrier Reef, subject of his present lecture, is an amazing coral formation some 1,200 miles long, which lies in tropical and semi-tropical waters off the coast of Queensland. Surface beauty of the long chain of islands is more than rivalled by that beneath the water, and the Barrier Reef is a wonderland for the tourist, the big-game fisherman, and the ichthyologist.

April 12—Campfires on the Sea

Peter Koch

Mr. Koch, well-known photographer-naturalist, supplies the following synopsis of the natural color films which accompany his lecture: "Out of the north country the blue geese migrate southward; they reach the willow-bordered Ohio and Mississippi Rivers; the extensive marshland of Reelfoot Lake is a focal point for migration routes of the Mississippi flyway. Here, too, is Cranetown, America's most beautiful 'bird city.' After seeing Cranetown during the nesting season, we proceed southward with the geese toward the delta—in a pirogue we follow interesting bayous—the habitat of boat-tailed grackles, redwing blackbirds, swamp sparrows, red-bellied woodpeckers, myrtle warblers, vultures, and fox squirrels. From a sandbar we watch the shrimp fleet come in, escorted by brown pelicans, gulls, and terns. Skimmers and white pelicans join the motley crowd on the bar, and await the change of tide at dawn. There is a visit to a neighboring 'Cajun's' muskrat camp. At the blue goose pond we obtain unusual and intimate studies of these wary birds, so seldom seen at close range, in their vast marshland home."

RESERVED SEATS FOR MEMBERS

No tickets are necessary for admission to these lectures. A section of the Theatre is reserved for Members of the Museum, each of whom is entitled to two reserved seats. Requests for these seats should be made in advance by telephone (WABash 9410) or in writing, and seats will be held in the Member's name until 2:30 o'clock on the lecture date.

April 19—China Journey

Karl Robinson

Mr. Robinson's lecture and films present essentially a story of the Chinese people whose government is now reoccupying its war-torn capital city of Nanking. People struggling with problems of economic change, where a ricksha coolie's earnings are now on a par with a New York City taxi driver's. Here is inflation!—a lunch costs thousands of local dollars. Three important sections of China that Mr. Robinson covers are the Yellow River, Peiping, and the Min River Area of Fukien Province near Foochow. The Yellow River has not acquired the name "China's Sorrow" without writing a very long and tragic history. For thousands of years men have fought to confine the river by heaping sand higher and higher in dikes. In 1938 the Chinese army blew a section of the dike away in order to halt the Japanese. The Japs were stopped and bogged down for months—but the river went on flowing through the break and inundating miles and miles of good farm land and displacing millions of people.

April 26—The Story of the Gems

Dr. J. Daniel Willems

Dr. Willems, a Chicago physician, is an enthusiastic lapidarist at such times as he is free from the duties of his profession. For more than a year, he collaborated with a competent professional motion picture photographer in producing a color film that would reveal the background of gem art and explain the exacting techniques of the gem-cutter to his colleagues and friends. The result has been a fascinating motion picture of great interest and beauty. Featured in Dr. Willems' film are examples of fine minerals, gems and jewelry selected from collections in this Museum and photographed in the building. Dr. Willems will use this film to illustrate his lecture here. Pictures and lecture together promise a most interesting exposition of the development of a hobby of the type that requires extreme perseverance, concentration and a high degree of skill.

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Wed., Mar. 5—Peoples of the Past (*Roberta Caldwell*).

Fri., Mar. 7—Primitive Glamour (*June Ruzicka*).

Wed., Mar. 12—Monsters of the Past (*Winona Hinkley*).

Fri., Mar. 14—The Gift of Green (*Miriam Wood*).

Wed., Mar. 19—From Amoeba to Ape—Classification of Animals (*Lorain Farmer*).

Fri., Mar. 21—Pageant of Spring—The First Birds, Reptiles, Insects, and Flowers (*Marie Svoboda*).

Wed., Mar. 26—Clean-Up, Paint-Up—Story of Paints and Varnishes (*Miriam Wood*).

Fri., Mar. 28—Story of Palms (*Marie Svoboda*).

MUSEUM WORKERS IN ROLE OF SHERLOCK HOLMES

By MARGARET J. BAUER

ONE of the little-known phases of the work of a museum is to supply information. The Museum's storehouse of knowledge and its technical staff are at the disposal of the general public as well as scholars. Authors and publishers often turn to the Museum for verification of facts, artists for ideas, and business men use the resources of the Museum to solve practical problems of industry.

Cartoon by Peggy Collings Brown

With the aid of references, and the technical knowledge of experts, many of the questions that come to the Museum can be answered without too much difficulty. Generally the questions are simple and often repeated, and need only the stock reply. In fact, should a Museum worker become so engrossed in his work as to be out of contact with the outer world (as specialist scholars are sometimes thought to be), the questions asked would tell him what season of the year it was. Invariably spring is announced in the Department of Zoology when someone calls in to ask, "How long does it take a robin's egg to hatch?"

Probably because of the peculiarly blind faith the layman seems to have in the ability of the scientist to solve his problem, the Museum scientist will do a great amount of sleuthing to find the answer for more obscure or difficult questions. Many times a seemingly easy and simple question is unanswerable. One inquiry, "Why does a rabbit's nose twitch?" stumped the experts. While there are many theories and much speculation, no one knows or has ever found the answer. Needless to say, the inquirer was surprised when no answer was forthcoming.

'DRY FROG' BRINGS FOG

Very commonly the question requires complete rephrasing to make sense. Sometimes the questions come in badly garbled. One classic example was a telegram sent in by a frantic crossword puzzle addict who wanted a five-letter word for a "dry frog on the upper Nile, beginning with the letter 'q'." It was given to the Curator of Reptiles to answer. He had never heard of a dry frog, especially on the upper Nile. He searched through the literature but found nothing. Painstakingly he began a systematic search through the q's in the dictionary. At last he found the word. It was *qobar* and it meant a dry *fog* on the upper Nile. In transcribing the message someone had written *frog* for fog. The crossword puzzle fan received the correct answer by return wire—collect.

Several years ago, one of the newspaper fads of the day was to run a series of prize-winning crossword puzzles. One part of the game was to decipher several small badly drawn pictures of objects, usually animals.

'BIG EARS, BUSHY TAIL . . .'

Inquiries poured into the Museum, usually in the following vein:

"Hello! Can you help me? I have an animal. It has four feet, big ears, bushy tail, and is climbing a branch. What is it?"

At first the Museum workers wondered what strange form of animal life had invaded the city, but soon they caught on when the inquirers insisted that "the name must be six letters long and begin with an 'a'." People were always startled when one could not give the answer right off. (The animal was an "aye aye," a Madagascan lemur.)

As the puzzles gained popularity, in self-defense the Museum workers tried to identify the animal pictures each day before the barrage of telephone calls started.

One day, when a particularly difficult what-animal-is-it picture arose, one of the researchers, as a last and desperate resource, paged through the index and picture section of an obsolete dictionary. To his joy he found the identical picture, a wood-cut, in the dictionary. The puzzle-makers had been using the pictures in this dictionary for their puzzle. After that the Museum worker was ready for his phone calls.

Upon occasion, more serious problems come in. Probably one of the most interesting and spectacular pieces of Museum detective work was done by Mr. Edmond Gueret, late Curator of Osteology.

'ELEMENTARY, WATSON!'

A detail from the police force came to the Museum and wished to see someone about bones. The two detectives were shown to Mr. Gueret's office. They showed him a tiny bone about a half-inch long and asked if he could tell them anything about it. Mr. Gueret saw that it was the joint of a little finger; that the epiphyses, or ends of the bone, were still soft, which meant a young person; and he judged the person to be a girl, because of the slenderness of the bone.

Mr. Gueret handed the bone back.

"What is it you want to know about this bone?" he asked.

"We found it in a furnace and we believe it might be the bone of someone we are looking for. Can you help us?"

"It is a joint of the little finger of a human being. She was a young girl about 18 years of age. Does that help?"

The detectives were astounded. How could he tell?

Mr. Gueret smiled and couldn't resist saying, "Elementary, my dear Watson, elementary!"

40,000 Beetles Received

The Museum recently acquired the larger part of the F. W. Nunnenmacher Collection of North American Coleoptera (beetles) including 40,000 specimens, representing 4,500 identified species, chiefly from the western United States. This acquisition was particularly desirable because the western species of this important group of insects had been rather poorly represented in the Museum's research collections. The latter now contain between one-half and two-thirds of the 25,000 species of beetles known to occur in North America.

Mr. Nunnenmacher was one of the best-known of the older coleopterists, and his was probably the only large general private collection of western beetles remaining.

AUTOPSIES REVEAL CAUSES OF DEATH AMONG ZOO ANIMALS

By DOROTHY FOSS
ASSISTANT, DIVISION OF ANATOMY

The museum of natural history can often make use of the skins or skeletons of exotic mammals, birds and reptiles that die at zoological gardens, and in some cases the entire animal may be preserved for anatomical study. The skins may be mounted for exhibition or may be prepared for the much more extensive study collections. The skeletons are carefully cleaned, and in addition to their use by anatomists and artists, their accumulation forms an essential base for the studies of paleontologists.

THE BEST ZOO ANIMALS NEVER DIE—

—they relive at the Natural History Museum, as a result of co-operation established with Brookfield and Lincoln Park Zoos. These emperor penguins, collected in Antarctica by Admiral Byrd for Brookfield, died of a fungus disease, but have been salvaged in this habitat group at the Museum.

A by-product of the museum-zoo relationship, which functions especially well between both Brookfield and Lincoln Park zoos, and Chicago Natural History Museum, is the accumulation of information as to causes of death among zoo animals.

I am frequently asked to make autopsies of the animals received. Taking the animals systematically by groups, the following general observations may be made:

Diseases of reptiles, on the whole, are somewhat difficult to diagnose. Internal parasites are found frequently, although there is doubt as to whether such parasites are the cause of the death. Snakes frequently get a disease of the mouth that interferes with eating, and if not treated, results in death.

LUNGS ARE BIRDS' WEAK ORGAN

The most serious diseases of birds are respiratory. Tuberculosis of the lungs is not observed as often as is an acute respiratory infection that kills the bird quickly. Weakened by other afflictions, birds die of the acute lung infection before curative measures can be applied. Among water birds, especially the penguins, there is a fungus that attacks the air sacs and lungs, often destroying the lungs completely. At least three-fourths of all zoo penguins die from this disease. Liver and kidney disorders also rank high in cause of death, together with tuberculosis of various parts of the body.

Omitting insectivores, edentates, rodents, and water mammals, because they rarely reach the Museum, marsupials head the list on the cause of death in mammals. Kangaroos and phalangers are the animals of this group most frequently received. Kangaroos are very susceptible to a disease referred to as "lumpy jaw." This disease takes the form of abscesses that form on the side of the jaws causing the destruction of the jawbone, and resulting in the falling out of the teeth. The animal is unable to take enough nourishment, and death soon follows. A few phalangers have been noted to have lumpy jaw, but a greater majority of them seem to die from an intestinal disorder. It is not known whether or not the lumpy jaw of marsupials is a disease related to the condition so termed in domestic cattle.

In the primates (lemurs, monkeys, and apes), respiratory diseases lead in cause of death, with digestive disorders in second place. For a period of time a large percentage of deaths was caused by tuberculosis, but in the past three or four years this disease seems to have been practically eliminated from our local zoological gardens. The primates on the whole seem to be a healthy lot, repiratory diseases being their greatest enemy.

The carnivores are rather long-lived, and a good many of them seem to succumb to the infirmities of old age. Occasionally a form of respiratory infection causes fatalities, and diseases of the nature of dog distemper may be suspected. Most epidemics even of so infectious a disease as distemper are usually halted before any great damage is done.

The majority of hoofed animals that have come under my observation have been antelopes. Acute digestive disorders seem to be the chief cause of death. Few cases of respiratory infection have been observed, and there have likewise been very few cases of tuberculosis.

Zoo animals as a whole are much longer lived than their wild brothers, and have a better chance to survive when illness or injury strikes them. Few of them die of injuries, as fatal fights are very rare among the mammals, and only occasionally will a bird kill a cage mate. They also run less risk of picking up parasites if the proper precautions are taken, as their food is selected for them, and their surroundings are always clean. With the excellent care afforded the zoo animal, it is small wonder they usually add years to the span of life that would have been theirs in the natural state. Records of animals in zoos nevertheless form our principal source of information on the longevity of animals other than the domestic animals and man.

EXPERIENCE CONSISTENT

As in all such general patterns, there are exceptions to the rule, but on the whole my experience has been consistent. Respiratory infections, including tuberculosis, seem to rank first in nearly all groups, with digestive disorders next, followed by other varied types of disease.

Comparison of my notes with the records of the London Zoological Gardens over a similar span of years, reveals considerable parallelism. Of the total number of bird deaths, more than half were from respiratory diseases, including tuberculosis. Next in importance were digestive disorders. It must be remembered that in many cases, if the animal had not already been weakened by other undetected disease, the respiratory infection would not have gained the upper hand. Some relation of incidence of disease types to age of the animal is to be expected.

An exhibit in Hall 34 contains pictures taken without light, by emanations from the radium contained in uranium and thorium minerals.

Visiting Hours Change March 1

Beginning March 1, spring visiting hours, 9 A.M. to 5 P.M., will replace the winter schedule of 9 to 4. The new hours will continue in effect until April 30, after which the Museum will be open from 9 A.M. to 6 P.M. until September 1 (Labor Day).

TALE OF A NECK— THE TURTLE'S

By RAINER ZANGERL
CURATOR OF FOSSIL REPTILES

Most persons think of anatomical features merely in terms of their beauty or ugliness. But many structural peculiarities of animals are of general interest because they show the workings of evolution. Living things are adjusted to their surroundings and there is a distinct relationship between the structural organization of an organism and the functions that it performs. Such bodily adjustments to particular functions are, however, not always of the same kind and consequently far from equally efficient. An example which will clearly demonstrate this fact is described below—the interesting ability of the turtles to retract their heads and necks under the protective cover of their shells.

The turtles have the most peculiarly modified anatomy found among vertebrates.

Fig. 1. X-RAYS OF A CRYPTODIRE

The common mud turtle, Sternotherus odoratus. In side view (above), the neck vertebrae (arrow) form an "S" shaped loop inside the shell. In dorsal view (below), the neck is retracted into the interior of the shell (arrow).

The major part of the body is encased in a solid, bony box, open in front and back to permit the head and neck, the limbs and the tail to be extended from it, or to be retracted under its protective margin. The shoulder girdle and the pelvic bones, to which the limbs are attached, lie inside rather than outside of the ribs, as they do in all other vertebrates. The vertebral column is fused with the bony shell in the trunk region. The tail is usually short. The vertebrae of the neck are greatly elongated, always eight in number, and the joints between these vertebrae are so developed that they permit considerable freedom of movement, a matter of great importance to an animal with an otherwise rigid body. Most modern turtles are capable of retracting the head under the protective rim of the shell, or, at least, of bringing it close to the shell, but the early turtles, the extinct Amphichelydia, could not do this. Retractibility of the head and neck developed in the course of time, and was accomplished in two radically different ways, the two solutions of the problem being by no means equally efficient.

In both solutions the neck is strongly curved; in all the so-called cryptodire turtles the curve lies in the vertical plane of the body (see Fig. 1), whereas in the pleurodires or "side neck turtles" the loop is formed in the horizontal plane of the animal (Fig. 2). In the cryptodires the neck is pulled into the interior of the shell where it is totally hidden from view and thus completely protected, but in the side-neck turtles it can only be pulled underneath the front lobes of the shell, where it is always partly visible from the outside.

Cryptodires are most familiar to us, since all North American turtles are included in this group. Pleurodires are mainly tropical in their distribution, but in the geological past they inhabited the northern temperate zones as well. Members of the modern genus *Podocnemis* of the pleurodire group have recently been described from the late Cretaceous marls of Arkansas and Alabama by Mr. Karl P. Schmidt, Chief Curator of Zoology in this Museum, and by the writer.

The representatives of the genus *Podocnemis* are freshwater animals and have an interesting, discontinuous geographical distribution at present: seven species inhabit northern South America and one species is restricted to Madagascar. This fact was widely used, in the past, as evidence in favor of intercontinental land bridges along which these animals were supposed to have reached their present distribution areas.

Fossil species of the genus were found in the Cretaceous of North and South America; in the Paleocene of the Congo; in the Eocene of England, Egypt and India; in the Oligocene of Germany and Egypt; and in the Miocene of Malta and Egypt. Thus the

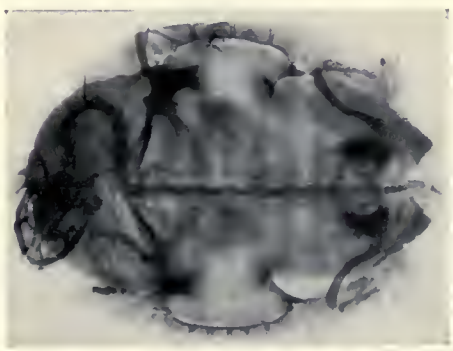

Fig. 2. X-RAY OF A PLEURODIRE

Rhinemys nasuta has the neck vertebrae in front of the shoulder girdle (arrow). Compare with Fig. 1 (below).

paleontological record indicates clearly that the genus had a wide, probably holarctic distribution in its early history, which, in itself, dispenses with the necessity for the hypothetical assumption of land bridges.

Furthermore, both North American species occur in marine shoreline deposits, and the species of the late Eocene of Egypt were discovered in estuarine beds, indicating that the dispersal of the genus might, at least in part, have taken place along the continental shores.

SPECIAL NEW FEATURES ADDED TO CHILDREN'S PROGRAMS

The spring series of free programs for children presented by the James Nelson and Anna Louise Raymond Foundation, including motion pictures and several special features, will be given on Saturday mornings during March and April. The programs begin at 10:30 A.M. in the James Simpson Theatre of the Museum.

The special features include a lecture on reptiles demonstrated with living specimens and other materials, a complete marionette show presented on the stage, and three motion picture programs accompanied by personal appearances of lecturers who will tell the story of the films.

Children may come alone, accompanied by adults, or in groups from schools, etc.

Following is an outline of the programs:

March 1—FISHING IN A BIG WAY.

Color motion picture showing salmon run and entire story of salmon. Lobster fishing and catches off Nova Scotia. Also a cartoon.

March 8—THE STORY OF REPTILES.

Told and demonstrated with materials, charts and living specimens by Jack Raymon, Director, Kentucky Reptile Garden.

March 15—THE CROW AND THE FOX.

A stage production by The Foltake Marionette Studio—Basil Milovsoroff, artist-producer, of Thetford Center, Vermont.

March 22—REVIVAL OF SPRING.

Color motion pictures of effects of spring on animals, birds, flowers and people.

March 29—HIGH COUNTRY.

Color motion picture of big game in the mountains of Colorado; story told by Alfred Bailey, Director, Colorado Museum of Natural History.

April 5—INSECT NEIGHBORS.

Also a cartoon.

April 12—SAID THE OWL TO THE SPOONBILL.

Color motion picture; accompanying story by Peter Koch.

April 19—THE EARTH "BLOWS HER TOP."

Story of volcanoes, by Winona Hinkley.

April 26—WINGS OVER IRELAND.

Also a cartoon.

Chicago Natural History Museum
FOUNDED BY MARSHALL FIELD, 1893
Roosevelt Road and Lake Shore Drive, Chicago
TELEPHONE: WABASH 9410

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Members are requested to inform the Museum promptly of changes of address.

'OUT OF THIS WORLD!'

Each year during the time of the National 4-H Club Conference in Chicago, the delegates visit the Museum as a part of their carefully worked out schedule. For the ensuing several months, the Director receives letters of appreciation from them. The following enthusiastic letter was written by a visitor from Rhode Island:

"Your Museum of Natural History is simply out of this world. When I went I thought it would probably be very dry, but I quickly changed my mind as soon as I stepped inside the door.

"Your animals are so real and alive. They look as if they're just awaiting there for you to come up and pet them. Someday if I ever get to Chicago again I hope to come to your museum and draw some of your animals. Do you mind?

"I want to thank you for the wonderful afternoon in your museum. I enjoyed every minute of it and I only wish I could spend more time there someday. Who knows though, maybe someday I'll be back."

Agate in Ancient Times

Agate was once more highly esteemed than it is at present. Theophrastus, who wrote his *History of Stones* in the 3rd century B.C., says, "The agate is also an elegant stone. Its name is from the river Achate in Sicily. It is sold at a great price."

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

Trinidad Village. By Melville J. Herskovits and Frances S. Herskovits. Alfred A. Knopf, New York, 1947, 348 pp., price $4.75.

For many years Dr. M. J. Herskovits, Professor of Anthropology at Northwestern University, has been well known as a leading authority on problems relating to the physical anthropology and ethnology of American Negroes. In this extensive research in the United States, West Indies, and South America Dr. Herskovits has been ably assisted by his wife.

The interest of these two scholars was first aroused during a temporary stay in Trinidad where they heard of local worship of the African god Shango. Years later they were able to carry out a systematic observation in a selected area of Trinidad.

The book carefully outlines the economic conditions of that area and shows these fundamentals in relation to the family and general social structure. The major portion of the work describes religious beliefs, divination and magic, and the technique of spiritual revivals. Both the lay reader and the scientific man will find great interest in the strange combination of beliefs and rites relating to a remote African religious background now blended with worship as conducted by the "Shouters" sect in some parts of America.

The book is illustrated and has an appendix of additional scientific material relating to Shango, the God of Thunder of the Yoruba people of Nigeria, West Africa. There is an adequate index and a useful bibliography.

WILFRID D. HAMBLY,
Curator, African Ethnology.

3 MUSEUM ANTHROPOLOGISTS COLLABORATE ON BOOK

Indians Before Columbus—20,000 Years of North American History Revealed by Archaeology, by Dr. Paul S. Martin, Mr. George I. Quimby, and Mr. Donald Collier, has just been released by the University of Chicago Press. It may be obtained from the Museum Book Shop ($6).

This, it is claimed, is the first time such a comprehensive account of the history of the North American Indian has ever been gathered together. Much of the information has never before been published. From the remains of the material culture of early Americans (pottery, mounds, cliff houses, and stone tools) the authors have reconstructed history from earliest times until the period of first contacts with Europeans.

Indians Before Columbus contains 122 illustrations, a glossary of archaeological terms, an extensive bibliography, and a full index.

The authors are members of the Museum's Anthropology staff. Dr. Martin is Chief Curator, Mr. Quimby, Curator of Exhibits, and Mr. Collier, Curator of South American Ethnology and Archaeology. They are all also Research Associates of the Department of Anthropology at the University of Chicago.

The book will be reviewed in the next issue of the BULLETIN.

Technical Publications Issued

The following technical publications were issued by Chicago Natural History Museum recently:

Anthropological Series, Vol. 33, No. 4. *Changing Kinship Systems.* By Alexander Spoehr. Jan. 17, 1947. 85 pages, 13 drawings. $1.

Fieldiana—Anthropology, Vol. 36, No. 3. *Cranial Capacities, A Study in Methods.* By Wilfrid D. Hambly. Feb. 4, 1947. 52 pages. $0.75.

Fieldiana—Zoology, Vol. 31, No. 7. *The South American Rodents of the Genus Neotomys.* By Colin Campbell Sanborn. Jan. 20, 1947. 8 pages, 2 text figures. $0.15.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Miss Marcia Capps, Minneapolis—a shell lei, Hawaii.

Department of Botany:

From: Mrs. Clifford Stout, Barrington, Ill.—39 herbarium specimens, Illinois; Miss Louise Raddin, Chicago—1,250 herbarium specimens, Illinois, Africa, Chile, and India; M. Acosta Solis, Quito, Ecuador—8,000 herbarium specimens, Ecuador.

Department of Zoology:

From: N. L. H. Krauss, Summit, Canal Zone—27 specimens of lizards, snakes, and amphibians, and 7 sea shells, Panama; Chicago Zoological Society, Brookfield, Ill.—2 capybaras and a black bear cub; H. S. Ducoff, Chicago—112 coral reef fishes, Saipan; G. S. Cansdale, Oda, Gold Coast, Africa—a flying mouse, Gold Coast; United States National Museum, Washington, D.C.—9 lizards, Syria.

Library:

From: Mrs. Frank W. Carson, Pasadena, Calif.; Dr. Henry Field, Cuernavaca, Mexico; Stuart H. Perry, Tucson, Ariz.; Stanley Field, Lake Forest, Ill.; and Donald Collier, Boardman Conover, and Rupert L. Wenzel, all of Chicago.

Raymond Foundation:

From: George W. Parker, Bloomington, Ill.—47 color slides; S. L. Gibbons, Chicago—13 color slides.

STAFF NOTES

Dr. Theodor Just, Chief Curator of Botany, has been appointed Research Associate in the Department of Botany at Northwestern University. . . . . Mr. Karl P. Schmidt, Chief Curator of Zoology, will lecture at Antioch College, Yellow Springs, Ohio, on March 6. . . . . *John W. Winn, Assistant in the Division of Fishes, recently spent several days in the Museum of Fishes at the University of Michigan, Ann Arbor, on special research.* . . . . Dr. Wilfrid D. Hambly, Curator of African Ethnology, will participate in the meeting of the African Anthropology Committee of the National Research Council, to be held at Northwestern University in Evanston on March 1. This committee's work is a continuation of that inaugurated by the same body for aid to the government during the war.

LAYMAN LECTURES RESUMED; 2 TOPICS EACH SUNDAY

After an absence of a month for an out-of-town lecture tour, Mr. Paul G. Dallwig, the Layman Lecturer, will resume his Sunday appearances—mornings and afternoons—at the Museum on Sundays in March (March 2, 9, 16, 23, and 30).

The subject of his morning lectures this month will be "The Romance of Our American Forests"; on each of the same Sunday afternoons the subject will be "Miracles in Wood." The morning lectures begin at 11:30, the afternoon ones at 2:30.

In the morning lecture on forests, Mr. Dallwig will tell of the currently vital problems involved in the conservation of this great renewable natural resource. He will also present interesting information about trees and, in a lighter vein, will relate interesting Paul Bunyan tales. The dramatic part of the lecture includes a sketch depicting early logging operations.

The afternoon lectures on "Miracles in Wood" will cover some of the new uses for this material recently discovered by scientists. Mr. Dallwig will explain the startling new scientific discoveries based on the chemistry of wood, making it possible to produce ethyl alcohol, plastics, and other commercial products out of "wood wastes." He will explain the terms "hardwood" and "softwood"; tell about plywood, veneers, etc.; and describe how fine woods are imitated in furniture and how to detect such imitations.

The heavy demand by the public for Mr. Dallwig's lectures, and the necessity of limiting the size of each audience, make it essential to require advance reservations.

In April, Mr. Dallwig's lectures will be "Who's Who in the Museum Zoo" (morning) and "The History, Mystery, and Romance of Museums" (afternoon).

A RARE TROPICAL PLANT IS FOUND BY MUSEUM BOTANIST

By JULIAN A. STEYERMARK
ASSISTANT CURATOR OF THE HERBARIUM

One of the most spectacular plants is the Madagascar palm (*Ravenala madagascariensis*). Not a true palm but rather a member of the banana family (Musaceae), it grows wild on the island of Madagascar. Its large banana-like long-stalked leaves spread majestically, double-ranked into a large fan-like cluster atop a woody trunk, which may attain a height of 35 feet.

Moreover, it is the only true woody member of the banana family, the banana itself being considered not a tree, but a giant herbaceous plant.

Because of its striking appearance, it has commanded much attention and is cultivated as an ornamental tree in all tropical regions. It receives the name "traveler's tree" from the fact that refreshing draughts are often obtained by travelers from the water caught and stored in the large cup-like bases of the leaf-stalks. A good photograph of the cultivated plant and an exhibit of a portion of the dried plant are displayed in Martin A. and Carrie Ryerson Hall of Plant Life (Hall 29); there is also a large mural by the late Charles A. Corwin, for many years the Museum Staff Artist.

Besides the species known from Madagascar, a second one, *Ravenala guianensis*, also of limited occurrence and rarity, grows wild in the Guianas and Brazil, and recently has been found in a native state in a remote portion of southeastern Colombia. During exploration for quinine-yielding plants in South America, I led an expedition on the upper Orinoco River to Mount Duida in southern Venezuela. At the base of that famous mountain a temporary camp was made along a rocky stream hemmed in by dense luxuriant rain-forest, consisting mostly of large palms and many kinds of forest trees, lianas, and various kinds of orchids.

About 200 yards from the camp my attention was suddenly attracted by a display of large banana-like plants growing among the palms. The large strap-shaped leaves, strongly ascending in a fan-shaped arrangement, surmounted a trunk about 35 feet tall and five inches in diameter. Standing stiffly among the leaves was an erect cluster, a couple of feet in length, of white and green flowers embedded in large bluish-green boat-shaped bracts which spread in two directions from the main axis. The appearance of the latter suggested a giant *Heliconia*, a common genus of the banana family

It was not possible to survey the entire extent of the stand at this locality, but many plants were counted within a half-mile radius. At the time of the discovery, I was not aware of the rarity and uniqueness of the plant I was collecting. After returning to the Museum nearly a year later, I had an opportunity of studying this material, and the identification revealed that this plant was indeed the famous *Ravenala guianensis*. It is the first record for this species from Venezuela. In French Guiana it is known as "bosch-banaan" (bush or wild banana).

Of additional interest is the fact that the giant leaves, measuring 10 to 20 feet in length, were used by the workmen on the expedition for thatch to cover some of the temporary shelters in camp. In this connection it is interesting to note that the leaves of this species in British Guiana and the one of Madagascar are likewise used by the natives as thatch material.

Pollination of the large flowers may be effected, at least in part, by birds, since they are known to visit the flowers of the species of Madagascar, as well as those of certain bananas and the bird-of-paradise flower (*Strelitzia reginae*) of the same family.

MADAGASCAR TRAVELER'S TREE—MURAL IN HALL OF PLANT LIFE

THE SECRET OF YOUR AGE IS IN YOUR BONES

By WILFRID D. HAMBLY
CURATOR, AFRICAN ETHNOLOGY

Men and women, particularly the women, of all times and places have made cunning attempts to cheat Nature and to give a false impression of the passage of years. Thousands of years ago, Egyptian women enhanced the beauty of their lustrous black eyes by the use of a dark pigment named "kohl" (antimony), and there has been widespread use of tattooing, facial cosmetics, elaborate hairdressing, and personal ornaments. All this, like the modern "hair-do" and other mysteries of a beauty parlor, was intended to rejuvenate and cheat the records of Father Time.

Case 8 recently added to Chauncey Keep Memorial Hall (Races of Mankind, Hall 3) may be a disappointment to the girls in showing that, despite all efforts to the contrary, Nature keeps a careful account of the years as they go by, marking the changes in the skull and long bones.

Every reader has been impressed by some newspaper story which gives an account of the gruesome discovery of a skeleton or perhaps the finding of parts of a skull under circumstances suggesting tragedy. The reader has perhaps wondered in what way an expert came to the conclusion that the bones represent a male adult of more than twenty-five years, or a young female of eighteen years. The new exhibit in this Museum illustrates in a simple way the skeletal differences of sex, and the changes which take place in skull and long bones from birth to maturity, and beyond.

A favorite test imposed on a student of physical anthropology consists of supplying the young aspirant with a large miscellaneous collection of human bones in a fragmentary condition. The student is asked to unite the appropriate fragments so as to reconstruct them, and he is required to state how many persons are represented, also their probable age and sex. This sounds like the $64 question of a radio quiz, but the guiding principles are simple, though not absolutely infallible in certain individual instances. Owing to a variety of causes—diet, work, disease—there may be an unusual speeding up or a retarding of the natural processes indicative of age.

SEX DIFFERENCES IN BONES

In general, the male has the larger and heavier skull. The larger brain-box of the male does not necessarily denote higher intelligence than that of the female. Brain weight is proportionate to body weight, and males are on the average considerably heavier than females.

The differences of sex are further shown by the heavier brow ridges of the male, his more massive jaw, and, at the back of the skull, strong ridges for muscular attachments. The eyesockets of the female are rounder, and have thinner margins than those of the male.

On the under side of the skull, the sex differences are seen in the larger mastoids, and in the broader palate and larger teeth of the male.

The arm and leg bones of males are, on the average, longer than the corresponding bones of females, and the male bones have stronger ridges to accommodate heavier muscular attachments.

SKELETAL RECORDS OF AGE

At birth, a human skull comprises many bones which are distinctly separated. Some of the bones, such as those on the top and sides of the skull, have saw-like edges (sutures) which gradually grow together. At the age of 50 years, all trace of the sutures has usually disappeared and the dome of the skull looks like one bone.

The ends of the long bones of arms and legs show a distinct division from the shafts in infancy, but generally these divisions have disappeared before the age of 25 years.

Teeth are often a reliable guide to age because there is a regular order of appearance. The first to appear are the juvenile (milk) teeth. These are replaced in regular sequence by the adult (permanent) teeth. The third molars (wisdom teeth) usually erupt at the age of 18 to 21 years, sometimes rather later.

With advancing age the angle of the jaw grows wider. Teeth fall out and the margin of the jaw becomes a thin, bony edge.

NATURE DECEIVES THE EXPERTS

Mother Nature seems in some instances to be whimsical and even with a sense of humor in deceiving the scientist with regard to age, sex, and even race. The scientist is sure of his general principles, but just mistrustful enough of the exceptions to temper his decisions with caution.

A reference to the deceptions of Nature in regard to age has been given. The sex traits are sometimes contradictory in a certain skull. The skull is small and feels light when poised in the hand, so suggesting female traits. But the mastoids and brow ridges are large and the ridges for muscular attachments are strong. In a collection of a hundred skulls there will always be a few of these sex problems.

In most races, the sex characters are clearly marked with the few exceptions noted above. Yet in some people, the ancient Egyptians for instance, males were of slender build and their bones have somewhat feminine qualities.

Work is a factor in enlarging and strengthening muscles. Consequently, in tribes where women are the agriculturalists, who hoe the fields and carry produce, the ridges for muscular attachments are unduly developed.

A scientist naturally dislikes to base his opinions on fragmentary remains, but this has been unavoidable in instances of the discovery of certain remains of fossil man of great antiquity. Therefore judgments are always cautiously expressed, and the prudent man leaves himself a back door open from which he can escape if further evidence challenges his original judgment.

Human bones are always white through life, and a visitor should not be misled by the brown or even black surface of some of the skulls in this exhibit. The dark color is post mortem, and may be due to the burial of skulls. Some people preserve the skulls of ancestors and of captured enemies as well, in the rafters of the home. There they rest perhaps for many generations, to be blackened by smoke from domestic fires.

The chemical changes due to aging bone cannot easily be demonstrated to visitors. Perhaps no demonstration is necessary. Our visitors know, perhaps, from painful experience, or by observation of aged relatives, that the gelatinous binding material of bone decreases. The matter then becomes extremely brittle. Fractures are easily sustained, and the process of repair is slow.

NEW MEMBERS

The following persons became Members of the Museum during the period from January 16 to February 15:

Contributors

Dr. Maurice L. Richardson

Associate Members

Mrs. Harry L. Canmann, Mrs. John Favill, Colin S. Gordon, Dr. Blair S. Latshaw, Miss Anna J. Wavrinek.

Annual Members

Mrs. Thaddeus V. Adesko, Lynn W. Beman, Henry J. Beutel, Frederic A. Birmingham, Earl J. Bush, Phil S. Dickinson, John J. Downey, Mrs. Raymond C. Dudley, Miss Jane Dyon, Will S. Ellis, W. A. Figueira, Samuel Fishman, Reuben S. Flacks, Charles Y. Freeman, Jr., Charles B. Genther, Joshua B. Glasser, Mrs. A. N. Hauter, Mrs. John R. Heyworth, Ray R. Hutmacher, Lee D. Jalkut, Joseph J. Janda, Charles D. Kaufmann, Mrs. John Lord King, Judson Large, Mrs. Luther M. Lorance, Justin MacKiewich, Mrs. L. G. Maison, Arnold H. Maremont, William Markoff, E. S. Marsh, Mrs. Louise C. M. Martin, Mrs. Alfred C. Meyer, Glenn A. Milleren, John T. Moran, Holbrook Mulford, P. M. Murphy, Mrs. George Pearson, Miss Bonita V. Plimpton, John C. Price, Samuel R. Rappold, Dr. Thomas P. Saltiel, George H. Schulz, J. R. Selby, Dr. H. Reginald Smith, Mrs. Adlai E. Stevenson, James H. Tatman, William M. Trumbull, M. G. VanBuskirk, Mrs. Ethel R. VanSchaick, Herman S. Waldstein, Allen M. Weary, Maurice Webster, Alfred C. West, Mrs. Seymour Wheeler, Mrs. Jay N. Whipple, W. J. Whyte, Mrs. Lucille Wickersham, Ralph E. Williams, G. J. Willingham, Henry F. Woulfe, Maurice M. Zusser.

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LIFE IN THE DEEP SOUTH CENTURIES BEFORE THE FIRST WHITE MEN ARRIVED

By GEORGE I. QUIMBY
CURATOR OF EXHIBITS, ANTHROPOLOGY

A visual story of prehistoric Georgia is shown in a new exhibit recently installed in the Museum's Hall of American Archaeology (Hall B). This new exhibit illustrates the culture of the Late Savannah River Indians as it existed in the period about A.D. 500–900.

PREHISTORIC GEORGIA—CULTURAL FEATURES OF THE LATE SAVANNAH RIVER INDIANS, A.D. 500–900

The Late Savannah River Indians occupied the coastal plains of Georgia, southern South Carolina, and northeastern Florida. They made their living by hunting, fishing, and the gathering of shellfish and vegetal foods such as nuts, seeds, roots, and berries. Their villages were groups of simple shelters built on top of refuse dumps of discarded clamshells, animal bone, broken pottery, and other junk.

The refuse dump or midden was much like a modern city dump, except that people were living on top of it. A modern city dump usually is located at the periphery of the city and refuse from all over the city is transported to the dump. The ancient dump or midden of the Indians was beneath the village and very convenient, too. The villagers threw their refuse on the floor or out the door, thus easily disposing of their refuse and at the same time building a solid, well-drained platform for their village.

The Late Savannah River Indians used tools and weapons of stone, wood, and bone, and ornaments of bone and shell. Lacking the bow and arrow, they hunted with the spear and spear-thrower. The spear-thrower was a device for throwing a spear with greater force than could be achieved by hand only. This weapon consisted of a wooden shaft about 15 or 20 inches long. At one end of the shaft was a handle or grip. At the other end was a socketed antler hook for engaging the butt of the spear. For purposes of greater momentum and force, stone weights were attached to the spear-thrower shaft. These weights were prism- and wing-shaped bannerstones, rectanguloid bars, and boat-shaped stones.

Spears were made of wood or cane and tipped with large lopsided triangular points chipped from flint or hard slate. These points had stems which were used in hafting the point to the wood or cane spear shaft. Other types of spear points were made of bone and antler. These were conical and socketed for hafting.

Various kinds of fish were caught with bone hooks or nets weighted down with small perforated soapstone slabs or notched soapstone pebbles. Large ovate and triangular knives were made of chipped stone, as were cross-shaped and expanded base drills. Fully grooved or three-quarter grooved axes were made of stone by grinding and polishing. Whetstones may have been used for shaping bone tools. Large and small spherical stones were used as hammers.

Stone mortars and disk-shaped mullers or grinders were probably used in the preparation of collected foods—nuts, roots, wild seeds, and the like. There were a number of styles of bone awls, antler flakers, antler handles, cylindrical tubes, spatulas, and chisels.

Necklaces were made of small disk-shaped beads of stone or shell, spherical shell beads, and tubular shell beads. Another style of bead was manufactured by cutting the spires from olivella shells. Rectangular pendants with single holes used for suspen-

sion were made of bone or shell, and two-hole bar gorgets were made of ground stone. Long and short bone pins of various styles may have been ornaments. Some of these were decorated with painted or incised designs.

Pottery was made of clay tempered with Spanish moss or other vegetal fiber. Only bowls were manufactured. Most bowls were plain, but many were decorated with punctate and linear punctate impressions arranged in simple geometric patterns.

The dead were deposited in graves dug into the midden. Some of these graves were round pits. The bodies were flexed, extended, or disarticulated and placed in bundles. Probably the bundle burials represented a secondary deposition of the dead: burial of the bones of individuals that had either been buried elsewhere and disinterred or that had been allowed partly to decompose before burial. Burial furniture was not abundant, although there were grave offerings of tools, weapons, and ornaments with some of the burials.

The Late Savannah River Indians were descended from the Early Savannah River Indians, who had the same kind of culture, for the most part, but lacked pottery. Although the Early and Late Savannah River cultures are part of the same continuum, the latter culture is particularly interesting because it is indicative of the early transition from ancient hunting cultures to later agricultural peoples.

By looking at the new exhibit, a Museum visitor can obtain most of the information that I have just presented more easily and more quickly than by reading this article. The objects shown in the exhibit were excavated from a Late Savannah River Indian refuse dump or shell midden in Georgia. The new exhibit was created by Mr. Gustaf Dalstrom, artist in the Department of Anthropology.

The cross-shaped staurolite twins, sometimes called "fairy stones," of which examples are shown in the Museum's mineral collection, are often used as charms or luck stones.

CHANGING YOUR ADDRESS?

Members of the Museum who change residence are urged to notify the Museum so that the BULLETIN and other communications may reach them promptly. A post card for this purpose is enclosed.

Members going away during the summer may have Museum matter sent to their temporary addresses.

SPOEHR FLIES TO MICRONESIA; OTHER 1947 EXPEDITIONS

The Museum's first expedition of the 1947 season was launched March 16, when Dr. Alexander Spoehr, Curator of Oceanic Ethnology, left Chicago for San Francisco, from where he flew to the South Pacific groups of islands known as Micronesia. Dr. Spoehr is a lieutenant in the U. S. Naval Reserve who served in naval aviation during the war largely in the area he will now survey.

The Micronesian expedition marks the resumption of the Museum's long-standing interest in the peoples of the Pacific area, anthropologists from the Museum previously having worked years ago among the native peoples of the Philippines, the Netherlands East Indies, the Malay Peninsula, and the islands of Melanesia.

Dr. Spoehr will conduct his work among the natives of the Marshall Islands, one of the groups formerly mandated to Japan. The purpose of the expedition is to study the present-day social, economic, and political structure of the native society in order to determine how contact with modern western civilization has affected native culture and what its present characteristics are. The results of the expedition are expected to be of value both in the comparative study of native cultures and as a means of providing the factual basis necessary in the successful administration of the island peoples.

"The United States has found itself in the position of having acquired the former mandated Japanese islands through conquest, but without having an adequate knowledge of the native inhabitants," says Dr. Spoehr.

The Micronesian Expedition is also part of a wider program for the co-ordinated investigation of Micronesian anthropology, sponsored by the Pacific Science Board of the Navy Department.

Dr. Spoehr stopped in Honolulu for some preparatory studies at the University of Hawaii and the Bishop Museum. Thence his itinerary carries him to Kwajalein and Majuro in the Marshall Islands. About July 10, he will fly to Guam and the Marianas, where he will engage in further work at Saipan and Tinian. Late in the summer he will return to his post at the Museum.

Other Expeditions

Ten other expeditions are still to be dispatched from the Museum later in the 1947 season, and four that departed in 1946 are remaining in the field.

The expeditions scheduled to go are:

An Archaeological Expedition to the Southwest, to excavate prehistoric Indian sites in New Mexico under the leadership of **Dr. Paul S. Martin**, Chief Curator of Anthropology, will be in the field from June 15 to September 15.

Dr. Sharat K. Roy, Chief Curator of Geology, and **Mr. Harry E. Changnon**, Assistant Curator, will begin about the second week in June a ten-week circle journey in various fields from the Adirondack Mountains to various sites in the Far West to collect physical geology, economic geology, and metallic mineral specimens.

Early in June, **Mr. Bryan Patterson**, Curator of Paleontology, and **Mr. James H. Quinn**, Chief Preparator in Paleontology, will go to Colorado to collect specimens of prehistoric vertebrate mammals.

On April 15, **Mr. William Turnbull**, of the Department of Geology, will leave for Alabama to collect specimens of fossil turtles. **Dr. Rainer Zangerl**, Curator of Fossil Reptiles, will conduct an expedition to collect fossil turtles in Washekie Basin, Wyoming.

Mr. Karl P. Schmidt, Chief Curator of Zoology, will go during the summer on an expedition to Texas for the continuation of zoogeographic studies carried on in previous years.

Mr. Colin Campbell Sanborn, Curator of Mammals, accompanied by **Mr. Louis de la Torre** from the University of Michigan, will conduct an expedition to Texas and Mexico, its purpose being to collect specimens of mammals.

Mr. Clifford H. Pope, Curator of Amphibians and Reptiles, will conduct a two-months' expedition in western New Mexico to survey the reptiles and amphibians in the forests of certain areas whose fauna is incompletely known and to study the altitudinal distribution of reptiles in the mountains from 2,500 to 14,000 feet altitude.

Dr. Fritz Haas, Curator of Lower Invertebrates, accompanied by **Mr. Joseph B. Krstolich**, Artist-Preparator, will conduct an expedition in Bermuda to study the life of coral reefs—corals, crustacea, sea anemones, sea urchins, sea cucumbers, and fishes.

As a contribution to the Museum, **Mr. and Mrs. William Street** have arranged both to finance and conduct an expedition to Alaska, in May, to collect specimens of the Alaska brown bear (Kodiak bear) for a new group in the Museum. **Mr. C. J. Albrecht**, formerly a staff taxidermist at the Museum, has been engaged to accompany the expedition as a special representative of the institution. On his return Mr. Albrecht will mount and install the new group at the Museum.

The expeditions in the field, carried over from 1946, include a botanical expedition to Central American countries, being conducted by **Mr. Paul C. Standley**, Curator of the Herbarium; a zoological expedition to Trinidad in the British West Indies, being conducted by **Mr. Frank C. Wonder**, Staff Taxidermist; a botanical expedition to the interior of Cuba, being conducted by **Dr. B. E. Dahlgren**, Curator Emeritus of Botany; and a zoological expedition to the Philippine Islands under the leadership of **Capt. Harry Hoogstraal.**

HUNTING RABBITS WITHOUT A GUN

By PAUL C. STANDLEY
CURATOR OF THE HERBARIUM

The Everglades that comprise all southern Florida are an almost perfectly flat area only a few feet above sea level, from which the summer rains drain very slowly. Most of the land consists of pine savannas with a low growth of grasses and hundreds of kinds of small plants, many with beautiful flowers. Interspersed through the pine woods are bald-cypress "hammocks," slight depressions, usually with a pond in the center, containing many water plants and surrounded by dense thickets of myrtle and other shrubs.

Among the shrubs arise tall cypress trees with slender pale trunks whose bark is almost like soft velvet. The hammocks occupy places usually filled elsewhere by rivers—there are no real rivers here, at best small streams—and along the chains of hammocks the water drains slowly to sea.

Great areas of savanna and hammock land remain even in those parts of the Everglades where vegetables and citrus fruits are cultivated, and these wild areas are one of the most densely populated refuges of wild life to be found anywhere in the United States. Birds live here in countless numbers despite the disappearance of such former residents as the Carolina parrakeet and the great rarity of others, such as the flamingo and ivory-billed woodpecker.

VENOMOUS SNAKES

There are uncomfortable numbers of moccasins and rattlesnakes. Alligators persist even in well-settled areas and may be seen along or even on the paved roads. Wild turkeys and deer are bagged in large numbers during the open season, and in the most remote swamps black bear and panthers survive.

One of the most interesting mammals is the swamp rabbit, in size and appearance much like the northern cottontail. Because of the peculiar environment, its habits are somewhat different. During the summer the savannas are covered with shallow water seldom more than two or three inches deep, too shallow to drown the smaller animals but enough to keep their feet always wet. The rabbits feed on the higher ground, but if molested they race for the swamps. When frightened, they make no attempt to avoid water, but dive into the ponds and swim across them or lie quietly among the plants in the margins.

Upon my first visit to the Everglades a good many years ago, I was invited one morning to go rabbit hunting with my sister. Noting that she was accompanied by a dog but carried only a hatchet, I asked whether she were not going to take a rifle, but was told there was no need for one. The route followed led toward a cypress hammock. The cypress trunks have enlarged bulblike bases, and between the trees are many conelike "knees" that project above the water and are supposed to serve as breathing organs. The lower part of the trunk often is hollow, as the sequel proved.

RABBIT CAUGHT BY HAND

We had not proceeded far when the dog raised a rabbit and began barking madly on its trail. At the edge of the swamp the dog was soon barking at the foot of a rather small and slender cypress in whose base there was an inconspicuous opening. The trunk was tapped tentatively with the hatchet; then a hole was cut some four feet above the base (often it is cut still higher) with the hatchet through the thin wood. A hand thrust upward into the hollow grasped the hind legs of the panting animal and hauled him from his retreat.

This is the conventional method of rabbit hunting in the Everglades, economical of ammunition and with few failures. The rabbit is so tightly wedged into the narrow channel within the tree trunk, pushing upward just as far as his head permits him to climb, that one wonders that he can free himself when he feels safe again.

In New Mexico, almost 40 years ago, I saw another quite different kind of rabbit hunting by the Spanish-speaking residents of the Rio Grande Valley near Las Cruces. These people, who have inhabited the valley for many centuries, are descendants of agricultural Indians like the Pueblos of more northern New Mexico, and cling tenaciously to many ancient customs.

ANNUAL DRIVE

Here it was formerly—and may still be—customary to hold a rabbit drive once a year or oftener, usually in late autumn. The affair was directed by a responsible "chief" of the rabbit hunt, who marshaled as many men and boys as possible, armed at least with clubs, and many of them with short curved throwing sticks of hard wood. These sticks can be thrown by a skilled man with considerable accuracy and will return to the thrower like an Australian boomerang.

Stationing the men in a great circle around a selected area, usually upon the high level mesa above the Rio Grande Valley, the circle was gradually narrowed as the men advanced on foot, urging the cottontails and jackrabbits, both very abundant in this region, toward a chosen center. If the circle was sufficiently large at first and care was used to keep the rabbits within it, a large number of them often were herded into a close mass and slaughtered by clubbing or by use of the throwing sticks. At the end of the hunt the dead animals were soberly apportioned by the chief and carried away for a feast.

These New Mexican rabbits, in contrast to the Florida ones, have little acquaintance with water. They live on plains where for most of the year not a drop of water is obtainable, and in their whole lives they probably never see even the smallest pool or trickle of water, even when the scant summer showers fall.

HARES AND EXOTIC RODENTS ADDED TO EXHIBITS

Recent acquisitions have made possible the exhibition of formerly unrepresented rodents from South America, Asia, and Africa. These have been added to the screen of exotic rodents and hares in Hall 15. The Peruvian viscacha, a larger relative of the chinchilla, which lives at altitudes from 3,000 to 16,000 feet in the Andes, is now shown. Also, the large burrowing bamboo rat of China, so called because it feeds largely on bamboo, and the Patagonian cavy, a large almost tailless rodent of the Argentine pampas, are now exhibited.

HUTIA CONGA
Specimen presented by the Chicago Zoological Society

Of especial interest is the arboreal hutia conga from Cuba, one of ten forms of hutias found in the West Indies. As the heavy forests are cleared for agriculture or grazing, these mammals are gradually becoming rarer. Some have been successfully raised in captivity and were found to make gentle and interesting pets. Only one or two young are born at a time, after a gestation period of, in the conga, 123 days. The conga does not have a prehensile tail as do some of its relatives. It feeds on fruit and leaves.

An antelope jackrabbit and a snowshoe rabbit have been added to the exhibit of these mammals. Other additions are the pygmy rabbit, a small relative of the cottontails of the western United States, and two pikas or conies, one from Oregon and one from the mountains of western China. These mammals, related to the rabbits, are best known for their habit of making hay and storing it for winter use in the broken rock slides where they make their homes.

The new exhibits were prepared by Staff Taxidermist W. E. Eigsti.

—C. C. S.

A PYTHON IN THE HOME

By CLIFFORD H. POPE
CURATOR OF AMPHIBIANS AND REPTILES

"THERE are many ways of tackling big snakes," writes Dr. Malcolm Smith of the British Museum, "but the following method is as simple as any of them. Take a bath towel and wrap it several times around the left hand so as to protect it completely. Push this into the snake's face."

Dr. Smith, who is writing about the reticulated python, the largest of all, goes on to say that the snake's body will get wound about yours but that this is of no consequence provided the snake is not more than twelve feet long. He adds that it is well to have a friend at hand to unwind the snake's tail from your neck should the reptile happen to establish such intimate relations with you.

Reticulated pythons reach a length of a little more than thirty feet; so the towel method should not be used on all of them, even by the experienced snake catcher. It must be explained, however, that no python or boa is poisonous, if that helps any.

QUICKER THAN HUMAN EYE

Dr. Smith's advice may come as a surprise to those who have assumed that a big constrictor would squeeze or constrict an antagonist rather than use the teeth on it. Actually, boas and pythons defend themselves like smaller snakes and resort to constriction only when outmaneuvered. It is an appeal to the appetite that calls forth the feeding reaction, a combination of biting and constricting: the prey is seized and instantly encircled by the lithe coils. The action is too quick for the eye. First one sees the python confronted by the victim, then a flash of coils, and the two reappear, the smile on the face of the python and the prey in its jaws but almost hidden by its coils.

Surprisingly little pressure is required, because the terror inspired by the attack has made the victim reduce its girth to a minimum by expelling all its breath. The python merely takes advantage of this by drawing the coils tight enough to prevent expansion, and the prey quickly suffocates. It is hardly necessary to add that constriction also interferes with the victim's general circulation.

Stories of finding broken bones in the bodies of animals rescued from pythons are not true. One who doubts this can find out how hard it is to break bones in any animal by applying pressure evenly about the body of a dead animal.

'ATTRACTIVE PET!'

Some timid readers have no doubt thought by now, "But who wants to catch a big snake, anyhow?" Such a reasonable question deserves an answer. First, a small python or boa makes an attractive pet; second, the herpetologist does not yet know the answers to most of the questions that the layman is all too prone to ask. The only way to find out certain of the answers is to study living snakes.

HE CAN'T POISON YOU!

One procedure for handling a python: Wrap bath towel around left hand and push it into the snake's face. If he winds himself about you, be nonchalant — just have a friend undo the coils. Some caution is advised, however, and Cartoonist Peggy Collings Brown suggests the inconvenience that may result from catelessness.

Some of these questions without answers are:

How fast do the giant snakes grow?
How long does it take them to grow up?
How long do they live?
How much can they learn?
How do they crawl?
How much do they weigh?

It is embarrassing to the herpetologist when reptile keepers and amateurs ask these and many other questions. I know a circus man who even says that a herpetologist is the last person to consult about reptiles. Since there is no one else to ask, the only solution for the reptile student is to work out *all* the answers for himself. At present he does know a lot about the classification of reptiles, but few laymen lose sleep because they do not know whether the blue racer and the king snake, let us say, are first or second cousins.

SNAKE OR YOUR WIFE?

Often the lay interest is of a drastically practical nature. Every year, for instance, the Museum receives calls from new house owners whose wives are finding garter snakes in the yard or even in the basement of their suburban homes. Methods for eradication of these "pests" are urgently desired because the wife has issued an ultimatum—a choice between wife and snake! After elaborating on the difficulties of eradication and explaining that garter snakes are harmless and interesting creatures, I suggest that it might be easier to eradicate the feminine fear. The clear and emphatic reply never varies: "Yes, but you don't know *my* wife!" At this point I ring off; it is obvious that far too few men, when choosing a mate, consider the dread of snakes a serious drawback, and it would be contrary to public policy to suggest elimination of the wife herself.

In northeastern Burma on October 3, 1945, a snake was found under the sugar barrel in the mess hall of an Army laboratory. It was noisily announced as a seven-foot cobra, but closer examination proved it to be an infant python less than three feet long. Through the kindness of a colleague it was presented to the Museum in December, 1945. After biting at us a few times, this snake settled down to laboratory life with such ease that we were soon convinced of its value as a living rather than as a preserved specimen. It fed readily and in other ways proved itself to be in excellent condition.

After a few weeks, I took the python to my home because there temperature can be controlled day and night. The Museum laboratories, unfortunately, are not equipped to house living animals (and this is one of the valid excuses herpetologists have for being unable to answer all those questions). Placed in a clean box next to the furnace, where the temperature stays well above 70° Fahrenheit, the python began a complacent existence.

MR. POPE'S PYTHON GUEST

Three feet long when adopted in curator's home as a pet, it grew a foot in four months, and if it reaches full life expectancy it may eventually attain a length of 22 feet.

By February 10, 1946, it measured 41.5 inches and would immediately take food from my hand. Nearly two months later, on April 7, it had reached a length of 47.5 inches, thus proving that its new life was agreeing with it perfectly. Accurately measuring the length of many large snakes is all but impossible because they squirm and resist attempts to stretch them out. This python is an exception that proves the rule. If allowed to crawl against the wall, it will extend itself in a perfectly straight line and then a measurement accurate to

within a fraction of an inch can be taken by two persons using a tape measure.

Such rapid growth made me reflect on the place of a python in the home and exactly how long a python has to be before it wears out even the welcome of a herpetologist. Uncertainties were involved, because the growth rate of Indian pythons is not known. Would our Burmese reptile continue its rapid growth for years and, let us say, by 1950 attain a length of fifteen feet and a weight of 150 pounds? And what about that increasing appetite? Being cold blooded, snakes require little food and infrequent meals. Our pet had been put on a diet of a few mice or a small rat a week. This meant that rats had to be raised, and so a colony of the hooded variety was started by autumn when the snake's length had increased to 61 inches and its weight had reached 3 pounds 8 ounces.

After the python shed its skin, the gorgeous pattern caused even snake haters to exclaim, for then the iridescence of the scales added a splendor that defies description. On one occasion during the summer, our prize had stolen the show by causing guests to desert a birthday party for the company of the python. The inevitable embarrassment was one of those unforeseen difficulties of raising pythons in the home.

HOUSEBROKEN, TOO

On February 2, 1947, at the approximate age of eighteen months, this snake had a length of 72.5 inches, a girth of 7.21 inches, and a weight of 6 pounds 6 ounces; it constricted and devoured a large, dead, hooded rat in fourteen minutes. Sometimes captive reptiles get the worst of a battle with a rat, apparently because life in confinement has robbed them of part of their natural aggressiveness. Like other snakes, the python swallows all of its food whole, being unable to chew or tear it apart. This way of eating makes the snake one of the cleanest of eaters; ours had also become housebroken in a sense, but that is extremely unusual.

Coincident with evolving a long body and losing the limbs, the snake has acquired an expansible gape and jaws that work like a shuttle. The skin is so elastic and the jaws so loosely joined together and to the rest of the skull that the mouth can be stretched over a huge object with a diameter several times that of the head. The right and left jaws are alternately moved forward, allowing the inwardly curved teeth to grip the prey. Thus the snake literally pulls itself over the object, much as a housewife gets a pillowcase on a pillow by pulling it first here and then there. If the pillowcase got itself on without the help of the housewife, the simile would be perfect.

Once the meal enters the python's throat, muscles of the gullet and ribs co-operate to force the object along with surprising speed. It is the start that takes most of the time, although, when the reptile has tried to swallow something with a diameter several times that of its own head, many periods of rest are necessary. During these, the windpipe with its heavily reinforced walls is shoved out to the tip of the lower jaw and the lungs filled with fresh air.

The chain of events that began in Burma with a python, a sugar barrel, and some alarmed men is thus stretching halfway around the world to an end nobody can foresee. If this python survives, he may answer some of those puzzling questions. It is certain that he will also create problems. Try to picture, if you can, a twenty-foot snake, no matter how docile, comfortably coiled by your furnace!

CHINA HAD TALKING MOVIES AS EARLY AS 100 B.C.

More than a hundred years before the beginning of the Christian era, a form of talking motion picture plays originated in China, and it has continued in popularity down to the present day, despite the advances of modern cinematography. This type of entertainment is the ancient Chinese shadow-play, which anticipated the talking pictures of our time by having concealed readers to produce voice effects. Collections of the figures used in the action of these early moving pictures, obtained by various Museum expeditions in past years, form an interesting part of the exhibits in Hall 32, of which a large section is devoted to this and other forms of Oriental theatricals. The Museum also has examples of the screen and other equipment used for the projection of shadow plays.

The history of shadow-plays, and details of their production were traced by the late Dr. Berthold Laufer, former Curator of Anthropology who was leader of the Museum's expeditions to China. The scenarios used for the shadow-plays are derived from the literary drama of the legitimate stage, and they, with marionette shows, constitute the most popular theatrical pastimes of the Chinese. The reader, "in the wings," recites the words of the plot as the figures perform the action. The special appeal to popular taste lies in the fact that the the words are recited in the living vernacular, while until quite recently the repertoire of the legitimate stage of China employed the literary language, which was intelligible only to a limited educated group.

The acting figures in the shadow-plays are flat and ingenlously cut out of parchment, usually ox or sheep skin, evenly colored and varnished on both sides. When held against the light they are transparent. A screen of white gauze lighted by means of oil lamps from behind, is stretched between two poles. The figures, held by wires stuck into bamboo or reed handles, are skilfully manipulated behind the screen upon which their silhouettes are cast. Head, arms, and legs are cut out separately and hinged to the body, so that great agility of motion is assured. The shadow plays have an advantage over the Chinese legitimate stage which now, like the English stage in Shakespeare's time, is almost lacking in scenery, while in the picture plays the sea, clouds, rivers, gardens, mountains, palaces, temples, courts, and boats, as well as gods, demons and monsters, are all most excellently represented.

The performance is always accompanied by a small orchestra, while the various roles are recited by the operator behind the curtain. The plots are taken from Buddhist and Taoist lore, or incidents in the history of China. The shadow plays excel in comic or satiric subjects; their wit is aimed at human weaknesses, official corruption, and social and political evils.

The shadow play was originally of a religious character, and only gradually assumed the function of mere entertainment. It is without doubt, according to Dr. Laufer's researches, indigenous to China, whence it spread to the Persians, Arabs, Turks, and other peoples, finally reaching Europe. The first mention made of it is in historical annals relating to the year 121 B.C. The historian narrates an anecdote of Wu-ti, an emperor, who lost one of his favorite wives and was obsessed by a great desire to see her again. A magician appeared at court who was able to throw her shadow on a transparent screen. The story is symbolic of the general idea underlying the early shadow performances—the shadow figures were regarded as souls of the departed, summoned back into the world by professional magicians.

NEW MEMBERS

The following persons became Members of the Museum during the period from February 17 to March 15:

Associate Members

Harry Z. Perel, Frank C. Rathje, John Roggenkamp, Nathan Rosenstone.

Annual Members

Miss Carmen Aguinaldo, Robert J. Aitchison, Frederick W. Alger, John F. Barron, J. Algert Baukus, Ferrel M. Bean, Arnon N. Benson, Louis G. Berman, Mrs. James A. Cathcart, Dante Chimenti, D. A. Conroy, Ernest F. Corey, Dr. Francis M. Crage, Harry E. Davis, Milburn L. Forth, Robert R. Glenn, Otto W. Goes, Earl H. Graff, Mrs. Robert W. Hamill, George A. Hamm, Adam Hefner, Paul S. Hein, Robert E. Levin, Edward H. Loevenhart, Richard M. Loewenstein, N. S. Mackie, Maurice Mandeville, Lynn L. Mathewson, Edward L. Miller, W. S. Miller, Mrs. Norman G. Parry, Mrs. Harold M. Pond, Philip Rootberg, James V. Sallemi, Edward G. Sandrok, Mario M. Sciaky, Donald K. Searles, A. G. Shennan, Robert Philip Shepard, Robert W. Smick, Saul Stone, Mrs. William H. Tomhave, Mrs. Frank H. Towner, Mrs. Paula H. Townley, D. H. Voltz, Dr. Eugene L. Walsh.

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Members are requested to inform the Museum promptly of changes of address.

IMPORTANT ECUADOR COLLECTION RECEIVED IN HERBARIUM

The Museum recently acquired a large and important collection of plants from Ecuador, assembled for and presented to the Herbarium by Professor M. Acosta Solís of that country. This is the largest collection from Ecuador so far received by this or any other institution and one of the largest from a South American country to have reached the Museum.

The collection was made possible through the efforts of Dr. Julian A. Steyermark, Assistant Curator of the Herbarium of Chicago Natural History Museum. At the beginning of his wartime quinine exploration work for the government of the United States, Dr. Steyermark recommended that Professor Solís join the Cinchona Mission in Ecuador as a well-qualified field worker and student of the flora.

After some preliminary field work, Professor Solís spent more than a year in quinine work in various parts of Ecuador, during which time he collected assiduously numerous representatives of the flora. After his work with the Cinchona Mission was finished, he continued botanical exploration in various other parts of the country. During two years, he amassed a total of 6,283 numbered plants, amounting, together with the duplicates, to some 8,000 specimens.

Professor Solís, recognized authority on the flora of Ecuador, has contributed a number of articles to *Tropical Woods*, official magazine of Yale University School of Forestry, and to *Flora*, official publication of the Ecuadorian Institute of Natural Sciences, of which he is the director. In addition, Professor Solís is the author of several studies on the vegetation of certain areas of Ecuador, including a monograph on the province of Esmeralda, and lately of a book on quinine exploration in Ecuador.

As the flora of Ecuador is not too well known, Dr. Steyermark and Professor Solís plan to collaborate on a "Flora" of that country, an undertaking that will require many years of botanical exploration before completion. In this project, Dr. Steyermark will devote his time largely to a systematic study of the flora, while Professor Solís will secure additional collections and data pertaining to the ecology and economic uses of the plants.

Professor Solís' notable collection and the large number of plants (2,600) collected by Dr. Steyermark greatly augment such important historical collections from Ecuador as those of Spruce, Jameson, Liebmann, Sodiro, Father Mille, Rimbach, Mexia, Skutch, Penland, and others already in the Herbarium of the Museum.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

Indians Before Columbus, *Twenty Thousand Years of North American History Revealed by Archeology.* By Paul S. Martin, George I. Quimby, and Donald Collier. University of Chicago Press, 1947. Pp. xxiii+582, 122 illustrations, price $6.

The appearance of this timely archaeological synthesis thirty years after the publication of the first edition of Clark Wissler's *The American Indian* is an excellent measure of the remarkable acceleration in our knowledge of the aboriginal peoples of the New World. Whereas Wissler's book (3rd ed., 1938) was the first synthesis of our knowledge of *all* aspects of the life of American Indians past and present in North, Middle, and South America, this volume, larger in format and containing more pages, covers only the *archaeological* record for *North* America *north* of Mexico. Much of the data, it may be added, has been made available by excavations carried out only within the last ten to fifteen years and, even so, there are wide gaps in our knowledge, as the authors point out, for great stretches in Canada, Alaska, and even the Middle Atlantic Seaboard.

This book, therefore, is unique as well as timely and, although designed primarily for the layman and student, will be found indispensable to anyone who wishes to obtain up-to-date and authoritative information on the past history of the aborigines of this continent.

The manner of presentation is simple and direct. There is a glossary of technical terms and there are more than 100 illustrations. The reader is enabled to maintain both a geographical and a temporal perspective by the map of archaeological areas on the inside cover, appropriate chronological charts of the successive cultures of these regions in the text, and a master chronological chart covering four pages of Chapter 34.

After introducing the reader to the techniques of digging and methods of dating the objects found, there is a brief discussion of the origin of the Indians and of some popular fallacies about them. Then there follow several chapters on basic arts and industries, concerned with the manufacture of objects of stone, bone, and copper, of pottery, textiles, and so on. The earliest known cultural remains (Folsom, Cochise) are then described, followed by a systematic review and summary presentation of the material remains of the peoples who occupied the major geographical regions of the continent at various periods in the past.

But the book is not a mere compilation of data. The authors do not hesitate to enrich the meaning of the facts they have collected and synthesized. When they do this they say so; consequently, there are many paragraphs headed "Conjectures and Comments." To my mind, this is one of the most valuable features of the book. For facts never speak for themselves; they always need interpretation. The authors' comments often are in the nature of stimulating hypotheses, and many of their hypotheses should point the way to further investigation. If we ever are to have a super-synthesis of our growing knowledge of the American Indian, we shall need more first-order syntheses, such as the authors of this book have essayed, for other regions of the New World and for ethnographical as well as archaeological data.

A. IRVING HALLOWELL
Professor of Anthropology, Northwestern University

Technical Publications Issued

The following technical publications were issued by Chicago Natural History Museum recently:

Fieldiana—Zoology, Vol. 31, No. 8. *The Sheath-Tailed Bat of the Palau and Marshall Islands.* By Colin Campbell Sanborn. Jan. 20, 1947. 4 pages, one text figure. $0.15.

Fieldiana—Geology, Vol. 10, No. 3. *A New Anosteirine Turtle from Manchuria.* By Rainer Zangerl. Jan. 23, 1947. 10 pages, 4 text figures. $0.15.

AMERICA'S RAREST WARBLER CAUGHT BY CAMERA

By EMMET R. BLAKE
ASSISTANT CURATOR OF BIRDS

To the ivory-billed woodpecker, now reduced to a few scattered individuals, belongs the unenviable distinction of being America's rarest bird. Scarcely more abundant in this country, and certainly less well known, is the Colima warbler. This inconspicuous and elusive species is represented in the United States by a few breeding pairs restricted to canyons of high elevation in the Chisos Mountains of Brewster County, in southwestern Texas.

Photographing so rare a bird is an exciting experience for an ornithologist and there is added zest in being the *first* to capture it on film.

Colima warblers were long believed to occur only in the mountains of several

FIRST PHOTO OF COLIMA WARBLER

Mexican states. Only twelve specimens were known to science prior to 1928, when the first specimen recorded in this country was collected in the Chisos by Dr. Frederick M. Gaige, former Director of the Museum of Zoology, University of Michigan. Subsequent field work in that locality disclosed the presence of other Colima warblers, and eventually three nests were discovered.

Four additional nests were found in May and June, 1941, by the writer and Mr. Melvin A. Traylor, Jr., Associate in the Division of Birds, while conducting field studies in the Chisos Mountains. The series of natural color photographs, which we made at that time, includes studies of the nests and eggs, nestlings, and the adult warblers engaged in feeding their young.

RARE COLIMA WARBLER NESTLINGS

Our first nest was discovered by accident in Boot Canyon on May 25, when a small, unidentified bird was flushed from the side of a ravine near our camp. Its alarm calls indicated the proximity of a nest; so we withdrew a few yards and quietly awaited the bird's return.

It reappeared within a few minutes, but the nest was so well concealed that the bird, now identified as a Colima warbler, had to be flushed repeatedly before the nest could be traced to a clump of bunch grass. Four blind and naked nestlings, the first known to science, extended eager gapes toward us as we carefully exposed their nest.

A canvas "bird blind" was hastily erected near the nest and, with camera mounted and focused, we settled down within the blind to await developments. Such occasions are always critical, for birds differ in their tolerance of nest disturbance and many will not approach a foreign object even to feed their young. Our tension mounted as the minutes dragged, but the female finally returned to resume her domestic responsibilities in order to save the nestlings from the sun's rays.

During the days that followed, there was ample opportunity to observe, and to record on film, the activities of this rare species. In habits, and in general appearance, the Colima warbler is much like the related Virginia warbler of our Rocky Mountain states, but our photographs of so elusive a bird remain for us the highlight of our summer's field work.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Botany:

From: Prof. M. M. Lacás, Monterey, Mexico—161 herbarium specimens, Mexico; University of Texas, Austin, Texas—74 herbarium specimens, Mexico and Texas; J. Francis Macbride, Palo Alto, Calif.—273 cryptogams, Oklahoma, Texas, New Mexico, Arizona, and California; Dr. William Randolph Taylor, Ann Arbor, Mich.—47 specimens of algae of "Crossroads," United States atomic bombing expedition, Marshall Islands; Herman Silva, Knoxville, Tenn.—44 specimens of algae, Great Smokies National Park.

Department of Geology:

From: Dr. George H. Cox, St. Petersburg, Fla.—2 specimens of *Ostrea coxi* Gardner, Florida; Alfred M. Bailey, Denver, Colo.—5 photographs showing differential erosion; C. M. Barber, Flint, Mich.—a collection of fossil vertebrates, Alabama; Eugene Richardson, Jr., Winnetka, Ill.—one mineral and 6 rock specimens; Dr. Henry Field, Cuernavaca, Mexico—4 specimens of soil and sand, Mexico.

STAFF NOTES

Mr. Karl P. Schmidt, Chief Curator of Zoology, has been appointed a member of the Pacific Science Board of the National Research Council, a group of American scientists concerned with various problems in the islands of the South Seas. . . . **Mr. Philip Hershkovitz** has joined the Staff as Assistant Curator of Mammals. He took his master's degree in zoology at the University of Michigan in 1940. He has made two expeditions to South America to collect mammals. He spent the years 1933–37 in Ecuador and worked in Colombia in 1941–43 on the Walter Bacon Rathbone Traveling Scholarship. He served in the U. S. Army in Europe in 1943–46. . . . **Dr. Julian A. Steyermark,** Assistant Curator of the Herbarium, spoke before the St. Louis Horticultural Society on "Exploring for Plants in Guatemala." He was lately re-elected president of the Barrington Natural History Society. . . . **Dr. R. H. Whitfield** and **Mrs. Violet S. Whitfield** have been appointed Associates in Paleobotany. . . . **Mr. Llewelyn Williams,** Curator of Economic Botany, has returned to his post at the Museum after a leave of absence of fifteen months devoted to the study of latex-yielding trees and to field trips in Mexico and the West Indies.

Department of Zoology:

From: Leslie Hubricht, Battle Creek, Mich.—5 fishes, 45 land snails, and 11 sea crabs, Missouri, Virginia, and Louisiana; Ross Allen, Silver Springs, Fla.—114 freshwater shells and crabs, and 25 marine and freshwater fishes, Florida; Wendell M. Levi, Sumter, S. C.—6 domestic pigeons; Chicago Zoological Society, Brookfield, Ill.—2 mammals and a snapping turtle; Col. Clifford C. Gregg, Valparaiso, Ind.—a mammal specimen, Indiana; M. K. Jacobson, Rockaway, N. Y.—17 freshwater shells, Illinois; Walter L. Necker, Chicago—14 lots of shells, crustaceae, and worms, Mariana Islands; H. S. Ducoff, Chicago—820 specimens of shells and crustaceae, Pelew and Mariana Islands; Dr. D. C. Lowrie, Las Vegas, N. M.—71 specimens of shells, crabs, and worms, Texas; Lincoln Park Zoo, Chicago—a Mexican beaded lizard; Misses Ruth and Ellen Carlson, West Chicago, Ill.—a male Manx cat, Denmark; Dr. Henry Field, Cuernavaca, Mexico—19 scorpions, beetles, and allies, Mexico; Charles D. Nelson, Grand Rapids, Mich.—9 river clams, Michigan and Indiana; Dr. Jeanne S. Schwengel, Scarsdale, N. Y.—80 sea shells; Stanley G. Jewett, Jr., Portland, Oreg.—170 mammal specimens, New Guinea; State Natural History Survey, Urbana, Ill.—54 bumblebees, Mexico.

Library:

From: Stanley Field, Lake Forest, Ill.; Col. Clifford C. Gregg, Valparaiso, Ind.; Oakes Ames Botanical Museum, Cambridge, Mass.; and University of Chicago.

PROGRAMS FOR CHILDREN, SATURDAY MORNINGS

The James Nelson and Anna Louise Raymond Foundation will present the final four programs in its Spring Series for children on Saturday mornings during April. Motion pictures will be shown on all of the programs, and on two of them there will be personal appearances of story-tellers to interpret the films.

Following is the schedule:

April 5—INSECT NEIGHBORS.
Also a cartoon.

April 12—SAID THE OWL TO THE SPOONBILL.
Color motion picture; accompanying story by Peter Koch.

April 19—THE EARTH "BLOWS HER TOP."
Story of volcanoes, by Winona Hinkley.

April 26—WINGS OVER IRELAND.
Also a cartoon.

The programs will be presented at 10:30 A.M. in the James Simpson Theatre of the Museum. Admission is free, and children may come alone, accompanied by parents or other adults, or in groups from schools and other centers.

SUNDAY LAYMAN LECTURES TO END THIS MONTH

Last call for the Layman Lectures!

With two topics offered on Sundays in April (*April 6, 13, 20, and 27*), one in the morning and one in the afternoon, Mr. Paul G. Dallwig, the Layman Lecturer, will end his tenth anniversary season at the Museum.

"Who's Who in the Museum Zoo," at 11:30 A.M., and "The History, Mystery, and Romance of Museums," at 2:30 P.M., are the subjects for each of the April Sundays. The second of these lectures has not been presented in any of Mr. Dallwig's previous seasons.

The morning lecture, mostly about Asiatic and African animals, will include Mr. Dallwig's own dramatic account of the "two man-eating lions of Tsavo" that devoured 130 human beings—the lions are now mounted in Carl E. Akeley Memorial Hall of the Museum. Dr. Dallwig will tell the complete story of the late giant panda of Brookfield Zoo, "Su-lin," also now a Museum exhibit. Other features of the lecture are a discussion of the art of taxidermy and a dramatization of "A Day in Africa."

The afternoon lecture covers the origin and history of museums. Mr. Dallwig will tell how museums began merely as collections of "curiosities and rarities," some of the collections so gruesome that people complained they caused bad dreams, and then trace the development of leading European and American museums. He will discuss the functions of museums as research institutions for both scholar and layman, their place in our educational system for both children and adults, and their value to the community, with, finally, a forecast of their future and how their influence can be made more widespread by such mechanical advances as the perfection of television.

The heavy demand by the public for Mr. Dallwig's lectures and the necessity of limiting the size of each audience make it essential to require advance reservations. Lectures are restricted to adults. Reservations will be accepted by mail or telephone (WABash 9410).

With the close of this tenth season of his lectures, which were begun in 1937 and have become an ever increasingly popular feature of Museum activity, Mr. Dallwig will discontinue his appearances to take a long and well-earned rest. Mr. Dallwig undertook the lectures as a contribution to the Museum. He received no compensation, but was happy to give his lectures purely as a public service. For his contribution, he is entitled to the deep appreciation of the Museum, as an institution, and of the thousands of persons who have composed his audiences over the years.

PROGRAM OF LECTURE TOURS FOR APRIL WEEKDAYS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays; a schedule of these follows:

Wed., Apr. 2—April Fool in the Animal World (*Lorain Farmer*).

Fri., Apr. 4—Dressed in Sunday Best—Choice Clothing of the World's Peoples (*June Ruzicka*).

Wed., Apr. 9—The Earth "Blows Her Top"—Story of Volcanoes (*Winona Hinkley*).

Fri., Apr. 11—Indian America (*Roberta Caldwell*).

Wed., Apr. 16—Fashions in Foods—Effects of Food Customs on Peoples (*Marie Svoboda*).

Fri., Apr. 18—Drama in the Orient (*June Ruzicka*).

Wed., Apr. 23—Animals Go Courting (*Winona Hinkley*).

Fri., Apr. 25—The Land of the Mummies (*Roberta Caldwell*).

Wed., Apr. 30—Rare Animals (*Lorain Farmer*).

Babylonian, Roman, and Italian cameos and intaglios are represented by many choice examples in the gem and jewel collection (H. N. Higinbotham Hall, Hall 31).

SATURDAY AFTERNOON LECTURES FOR ADULTS IN APRIL

Four more lectures in the Spring Course for adults remain to be given on Saturday afternoons during April. Accompanied by color motion pictures, all lectures begin at 2:30 P.M. and are given in the James Simpson Theatre of the Museum.

SURGEON'S HANDS CUT GEMS

Dr. J. Daniel Willems, when he can get away from his medical practice, pursues his avocation as a lapidarist. He will lecture at the Museum April 26 on "The Story of the Gems" (with motion pictures).

Following are the dates, subjects, and speakers:

April 5—THE GREAT BARRIER REEF
A. H. O'Connor

April 12—CAMPFIRES ON THE SEA
Peter Koch

April 19—CHINA JOURNEY
Karl Robinson

April 26—THE STORY OF THE GEMS
Dr. J. Daniel Willems

No tickets are necessary for admission to these lectures. A section of the Theatre is reserved for Members of the Museum, each of whom is entitled to two reserved seats. Requests for these seats should be made in advance by telephone (WABash 9410) or in writing, and seats will be held in the Member's name until 2:30 o'clock on the lecture date.

The April 26 lecture by Dr. Willems will give the Museum audience a feature different from the type usually presented in these courses. Gems are a hobby of Dr. Willems, who is a practising Chicago physician, and like many amateurs in the arts he has cultivated an intense degree of skill outstripping many professionals. Equally "professional" in tone and technique is the color motion picture in which he shows the beauties of gems and reveals the exacting techniques of the gem-cutter.

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INDIAN MOUNDS: SOME FACTS ABOUT THEM, AND SOME FALLACIES DEBUNKED

By PAUL S. MARTIN
CHIEF CURATOR, DEPARTMENT OF ANTHROPOLOGY

MOUNDS occur for the most part only in the United States east of the Rocky Mountains; a few shell mounds are found along the Pacific Coast. Most mounds were built between A.D. 500 and 1100, and some of the largest ones were erected in the 15th century.

Up to comparatively recent times, many people believed that the mounds were built by a highly civilized group of peoples who were finally overrun and stamped out by the uncivilized Indians. This idea of a mighty nation with advanced ideas of government and religion and with great knowledge of all the arts and crafts, a nation that later disappeared, leaving behind no evidences of its wealth, glory, and power save the mounds, is a fascinating theory and one that, unfortunately, still has many adadherents.

MONKS' MOUND, LARGEST ABORIGINAL EARTHEN STRUCTURE IN AMERICA
In the Cahokia Mound group in southwestern Illinois near East St. Louis. It is greater in area than the Pyramid of Cheops. Drawing by Artist Gustaf Dalstrom of the Department of Anthropology.

Careful archaeological work in the mound area has dissipated all former ideas of an extinct race of "mound-builders" and has shown, without shadow of doubt, that the builders of all the mounds were American Indians, whose modern descendants were living somewhere in the Mississippi Valley when Europeans first penetrated the mound area.

The construction of the mounds presents no great engineering problem. Certainly there is no evidence that the Indians possessed any knowledge of machinery or any secret methods of construction. Building a mound involved willing laborers (there are no grounds for postulating slavery), co-operation, a preconceived plan, and hard manual labor.

One may gain some idea of the huge amount of work involved in building one of the larger Ohio mounds by considering the fact that it took the Ohio State Museum expedition of fifteen workers, equipped with teams and scrapers, about nine months to move the 20,000 cubic yards of dirt in a burial mound that measured 250 feet long, 150 feet wide, and 30 feet high, and every advantage of gravity was seized upon to hasten the work. Imagine, then, how much more difficult it must have been for the original builders to transport the dirt and to erect this great mound.

The method of building was very simple. Each person who was assisting carried dirt in baskets or skin bags and dumped his load on the ever-growing heap. Sticks, clamshells, stone hoes, or shoulder blades of bison, deer, or elk may have served to loosen or to dig the dirt.

There are four kinds of mounds:

1. Burial mounds
   a. Conical-shaped
   b. Linear-shaped
   c. Effigy-shaped
2. Temple mounds
3. Earthworks
4. Shell-middens

While burial mounds were intended exclusively as depositories of the dead, burials may also occur in temple mounds and in earthworks. The two last-named types of structures were not primarily built as tombs. It should be noted that the age of these mounds may vary considerably.

1. BURIAL MOUNDS

Conical-shaped mounds, as the name indicates, are shaped like a cone and occur all over the eastern United States. They range in diameter from 15 to more than 300 feet, and in height from 18 inches to 70 feet. Burials are found near the center.

Linear mounds may be from 20 to more than 250 feet long, 11 to more than 150 feet wide, and one to 30 feet high. This type of mound occurs mostly in the Great Lakes area. Burials may be found anywhere along the major axis.

Effigy mounds, occurring mainly in Wisconsin and most frequently representing bears, panthers, or birds, may range in length from 30 to more than 600 feet, and in height from one to four feet. Burials occur in the heart position, in the head, hips, shoulders, and between the hips and

INDIAN MOUND BUILDER EXHIBITS IN MUSEUM

The Cahokia Mound in southwestern Illinois was built by Middle Mississippi Indians about A.D. 1400–1700. Exhibits relating to the Middle Mississippi Indians are in the Hall of North American Archaeology (Hall B).

The Great Serpent effigy mound and the Miamisburg mound in Ohio were built by Hopewell Indians about A.D. 1100–1400. Many exhibits illustrating the spectacular culture of the Hopewell Indians are also in Hall B.

shoulders. The Great Serpent Mound in Ohio may also be classed as an effigy mound. Its length (in an air line) is about 500 feet. No burials have been found in it. It has frequently been claimed that effigy mounds were built to represent totemic or clan symbols, but there is no proof for this claim.

Anyone who thoughtlessly excavates a burial mound in the hope of obtaining loot or treasure will find that he has done back-breaking work for nothing; and, furthermore, unless one has had special training, he may do much damage and destroy valuable information. All excavations should be done under the direction of a competent archaeologist. Artifacts of any kind are rare in burial mounds.

2. TEMPLE MOUNDS

Temple mounds are always flat-topped and generally pyramidal in shape. They may also be square, rectangular, or round. Temple mounds may range in height from five to 100 feet; and the greatest breadth ranges from 20 to 1,080 feet. Almost every temple mound was provided with ramps or staircases leading to the top.

The temple mounds were erected as substructures for wooden temples—hence the name. Apparently, the builders wanted to raise their sanctuaries above the profane earth. The temple-mound idea probably originated in Mexico and spread northward. Wherever pyramidal or temple mounds occur in groups of two or more, they seem to be oriented about a plaza or central square. The flat-topped mound surmounted by a wooden temple was situated at either end of the plaza.

The largest mound of this type—in fact, the largest prehistoric mound in North America—is the great Cahokia Mound, near East St. Louis in Madison County, Illinois. It covers an area of approximately 16 acres and may best be described as a truncated pyramid, rectangular in form, with a broad terrace or apron that extends from the south side, all sides being well oriented in regard to north-south, east-west points. The greatest height of the mound is 100 feet; the east-to-west width is 710 feet; and the maximum north-to-south length, including that of the terrace, is 1,080 feet (*our Museum plot covers about 13 acres, and the longest dimension of the Museum building is 706 feet*). It is believed that a ceremonial wooden structure once occupied the spacious upper level.

THE SERPENT MOUND IN SOUTHWESTERN OHIO

Finest and largest effigy mound. Aerial photograph supplied by the Ohio Archaeological and Historical Society, Columbus.

3. EARTHWORKS

The term "earthworks" includes enclosures, walls, and embankments.

Enclosures were built in various shapes: circular, oblong, square, and octagonal. They occur in many parts of the eastern United States. The area enclosed by these earthworks may vary from one to 100 acres. The height of the embankment walls ranges from one to 20 feet.

The purpose of these enclosures is not known. They may have been built for religious reasons; they probably were not constructed for defense. Two of the better known ones are "Fort" Ancient and the Newark Works, both in Ohio.

4. SHELL-MIDDENS

Another type of mound is the shell-midden. The midden, however, is merely a large mound of refuse that is built up incidental to its occupation. The midden is very similar to a modern city dump. Middens range in height from a few inches to 12 or 15 feet and may be 1,000 feet in length. In contrast to other mounds, formation of middens is unintentional.

The custom of making shell dump-heaps was not confined to any one culture but seems to have been an environmental adaptation, inasmuch as they are generally found along the seacoasts or rivers where shellfish were plentiful.

WEEKEND TOUR SUGGESTION: VISIT A MOUND

You don't have to go to Iraq, Egypt, Peru, or even to Guatemala or Mexico, to experience a taste of the archaeologist's thrill at digging into ancient civilizations. As Dr. Martin points out, the largest prehistoric mound in North America is right in Illinois, near East St. Louis, an easy weekend drive from Chicago in your new (or even an old) car. Take U.S. Highway 66 to junction Illinois 43, 43 to junction U.S. 40, and the last to the mound—about 300 miles each way. For the spectacular Serpent Mount in Ohio, also a weekend trip of about 360 miles each way, the route is: U.S. 41 and 30 to Fort Wayne, Indiana; U.S. 33 and 127 to Greenville, Ohio; Ohio 49 to Dayton; U.S. 35 to Xenia; U.S. 68 to Wilmington; Ohio 73 to Hillsboro and the mound. South out of Dayton twenty-five miles is the Miamisburg Mound, highest (70 feet) Hopewell mound.

COAL WAS HEADLINE NEWS AEONS BEFORE NEWSPAPERS

By HARRY E. CHANGNON
ASSISTANT CURATOR OF GEOLOGY

Recent controversies over the mining of coal have made us keenly aware of the vital role coal plays in our society, which seems to function smoothly only as long as the delicate balance between raw materials, transportation, and specialized industry is maintained.

Coal has been known for centuries. As early as the ninth century it came into common household use in England and active world trade in it soon followed. The invention of the steam engine introduced a new industrial era and coal became the backbone of industry throughout the world. Countries endowed with it became world powers; those lacking it became mostly agricultural or handicraft nations.

PART OF RESTORATION OF A FOREST OF THE COAL AGE (250 MILLION YEARS AGO)

Coal still holds the eminent position of being the most important source of utilizable energy. Despite the inroads made upon it by petroleum and water power, coal still produces about 70 per cent of all energy units. Water power, even when developed to its fullest, is not likely to replace coal. Petroleum as the preferred fuel for mobile power units has encroached greatly on coal in this field. Nevertheless, increased efficiency of coal burning is counteracting the inroads made by oil and gas.

The future of coal as a leading source of utilizable energy appears to be assured, for it is widely distributed and world reserves are sufficient to last many thousands of years. Although atomic power promises to become an important source of utilizable energy, sources of uranium ore are limited and it is unlikely that atomic power will replace coal to any large extent in the near future.

ORIGIN OF COAL

Coals are compact masses of carbonized plant debris derived from vast accumulations of vegetable matter of former geological ages. The areal extent of the coal beds and studies of the plant fossils found associated with the coals attest that millions of years ago large sections of the world were covered by swamps and marshy places in which an ancient type of vegetation grew in wild luxuriance. The plants, both large and small, represented types related to the club mosses and horsetails of today, ferns, conifers, and the forerunners of modern seed plants, including some whose relationships to present-day forms are still obscure. These, growing year after year, died down, depositing in the comparatively shallow waters great masses of vegetal debris, which was subsequently transformed into coal.

In the transition of vegetal debris to coal, two stages at least were passed through—the first a biochemical and the second a geochemical stage. In the first stage, partial decay was brought about soon after deposition by wood-destroying micro-organisms. During this process of decomposition and maceration, biochemical changes liberated oxygen, hydrogen, and concentrated carbon, transforming the debris to a brownish or blackish matter with a high carbon content known as peat.

The second stage is termed geochemical because subsequent chemical changes in the transformation of peat to coal were determined by geological activities. The great masses of peat, due to oscillations of the earth's crust, were slowly depressed and subsequently covered with clay, silt, or sand, which today we find in the form of shales, slates, and sandstones overlying the coal beds. The process was necessarily slow, but, in the course of ages, these masses of peat, acted upon by fermentative heat and the pressure of the overlying rock masses, were metamorphosed to varying degrees and transformed into black mineral substances low in moisture and volatile constitutents and high in fixed-carbon content. These are commonly known as coal. The chief coal-producing districts of this country include West Virginia, Pennyslvania, Illinois, Kentucky, and Ohio.

EXHIBITS OF COAL

Among exhibits recently installed in Hall 36 (non-metallic elements and minerals of commercial importance) is one of the mineral fuels representing coal and peat. The exhibit aims to furnish an adequate introduction to the origin and classification of coal as well as to show by comparison the progressive changes that take place in coal as it is transformed from peat (the embryonic form of coal) through lignite (brown coal), to bituminous (soft coal), to anthracite (hard coal), in which the changes have gone the farthest.

In Ernest R. Graham Hall (Hall 38) the Museum has an elaborate reproduction of a scene in a swamp forest of the Coal Age (the Pennsylvanian period some 250,000,000 years ago), vividly represented in all the luxuriance that characterized it in life. The trees and other carboniferous vegetation are reproduced in life size, and a number of insects and animals of the same age are represented—dragonflies with a two-foot wing spread, cockroaches up to three and one-half inches long, and various primitive insects. This group, one of the largest in the Museum, is also one of the most spectacular reconstructions of a prehistoric subject ever attempted. The group, representing the labor of several years, was prepared in the plant reproduction laboratories of the Department of Botany for the Department of Geology.

Michigan Children Throng Museum

Ottawa County, Michigan, rural schools sent 1,000 grade-school children, from the age of 10, on a visit to Chicago Natural History Museum and the Shedd Aquarium on April 11. Another group of 900 is scheduled for May 2.

The first contingent came via Holland, Michigan, on a special train early in the morning and was at the Museum from about 11 A.M. to 4 P.M. Members of the Museum's Raymond Foundation school lecture staff and other Museum staff members conducted them on tours.

*'WHAT'S IN A NAME?' IN THE PLANT WORLD

By JULIAN A. STEYERMARK
ASSISTANT CURATOR OF THE HERBARIUM

"What's in a name?" is a phrase commonly used in a manner that might indicate that a name doesn't matter very much. Actually, names are all-important. They serve as definite and tangible go-betweens that enable man to designate objects and to classify them.

Names given to plants are often based on some of their obvious characters. But in many cases a question arises whether the word used as a plant's name existed before

SO-CALLED 'WOODEN ROSE'
It is really the fruiting stage of a tropical morning glory, with the capsule surrounded by thickened calyx lobes.

the plant was known or whether the word came into the language for other applications as the result of comparison with the plant. It is another case of the question: "Which came first, the hen or the egg?" Thus, "violet" perhaps became the common name for violets because the first plants seen by those who chose the name were of violet color; but it may just as well be that the color got its name because its shade approximated that of the variety of flowers called violet. Likewise, roses may have been named for their predominant color or the color for the plants.

Other obvious characters of plants were used in the selection of names. Thus, bloodroot was a logical name to give a plant that contained an orange-red coloring matter in its rootstock, a fact also expressed in the Latin generic name, Sanguinaria. The number of plants with descriptive names referring to some outstanding characteristic is legion: balloon-vine, blueberry, Turk's-cap lily, shooting star or bird's bill, spider lily, nipple cactus, bluebells, bell flower, crowfoot, larkspur, Dutchman's breeches, Dutchman's pipe, five fingers, pepper plant, sourwood, hens-and-chickens, pitcher plant, buckeye, turtlehead, and monkey flower.

An equally long list of names includes those plants that were said to possess healing properties. Good examples are snakeroot and rattlesnake master, both used for their supposed efficacy in treating snake bite; pleurisy root, more familiarly known as butterfly weed, for its reputed effects in alleviating pleurisy; boneset; and heal-all.

This naming of all objects is a natural as well as convenient and necessary procedure. But difficulties arise whenever numerous objects are considered. For instance, the name violet originally was applied to any member of the violet family or Violaceae. However, this did not last long, since it did not stop people from calling Saintpaulia, a member of the Gesneria family or Gesneriaceae, the African violet, because of the definite violet color of its flower, nor from giving cyclamen, a member of the primrose family or Primulaceae, the popular name of alpine violet. These cases emphasize the need of reserving for each plant a universally adopted Latin name that is understood by botanists and plant-lovers all over the world.

By careful study of the structure of the flower as well as of the vegetative characters of the stems, leaves, and roots, and of the internal anatomy, botanists have been able to classify plants and place them into groups of families, those of one family possessing a given set of characteristics distinguishing them from those of another family. Thus, the flower of a true violet (Violaceae) is quite different from that of an alpine violet (Primulaceae) or African violet (Gesneriaceae). However, because of some resemblance to the true violets, or to the habit of their growth, the other names have been allowed to persist.

FALSE LILIES

In this manner we encounter many plants that are not true lilies or members of the lily family (Liliaceae) with popular names suggesting that they are true lilies: spider lily (Pancratium) of the amaryllis family (Amaryllidaceae), water lily (Nymphaea) of the water-lily family (Nymphaeaceae), and ginger lily (Hedychium) of the ginger family (Zingiberaceae). Similarly, although the apple belongs to the rose family (Rosaceae), the following names were given because of some supposed resemblance to an apple: rose apple (Eugenia Jambos) of the myrtle family (Myrtaceae), pineapple (Ananas) of the pineapple family (Bromeliaceae), and custard apple (Annona) of the custard apple family (Annonaceae).

Thus, as the common names become more and more misleading, the layman becomes more and more confused. Because the layman's time is limited, names should have clear and definite meanings. It is regrettable, therefore, that names are often purposely misapplied for commercial purposes or in the hope of giving people fanciful impressions. By obscuring the true origin and nature of a plant under an unnecessary or strange name, the public receives false information and the existing confusion is increased.

A case in point is the recent introduction on the market of a plant belonging to the buckwheat family (Polygonaceae). It is a species of Eriogonum originating from the mountains of southern California. The plant grows with the habit of some alpine or desert species, with cushion-like rosettes of tiny thick gray leaves spreading from the tips of woody rusty-brown or coppery curved branches. The colorful stem continues for some distance below the ground, branching and winding into the extensive root system; when removed from the soil, it has a curiously twisted wind-beaten appearance, much like the bark of some weather-beaten mountain juniper or fir. The leaves are either left in their natural gray state or are sprayed to give a lively green color.

These plants may now be seen in the windows of florists, jewelers, and gift shops of the larger cities, not under their rightful name Californian Eriogonum but under the misleading one of Peruvian cypress tree. The last name undoubtedly increases the sales and creates a sense of the exotic, although it adds to the confusion of the public. Since the plant resembles in shape some dwarfed Japanese trees, it is also readily mistaken for them. Prolonged collecting and sale will lead to the extinction of this plant, for it grows in a very limited mountainous area.

'WOODEN FLOWERS'

Other misnomers that have come into the trade and are perpetuated by florists and

MISNAMED 'PERUVIAN CYPRESS TREE'
Actually it is a species of Eriogonum of the buckwheat family from the mountains of southern California.

others are "wooden rose," "wooden flower," and "spoon flower." The last is really the entire leaf of the sotol plant (Dasylirion Wheeleri) with the firm polished-appearing

*An article entitled "What's in a Name," treating of nomenclature in zoology, appeared in the BULLETIN (then *Field Museum News*) of August, 1939.

broadened base displayed as the tip. "Wooden roses" are actually not roses at all, but the fruiting stage of a large yellow-flowered member (Merremia tuberosa) of the morning glory family (Convolvulaceae). The spreading calyx-lobes in this case persist in fruit and become thickened and brown, spreading out horizontally in the form of petals and surrounding a large shining globular capsule, which contains the seeds. A smaller example of this type of fruit is on display in **Case 843 of Martin A. and Carrie Ryerson Hall (Plant Life—Hall 29).**

To the layman, "wooden rose" sounds quite alluring and exotic, but actually it may be a letdown to some people to learn that it is only a type of morning glory in fruit. "Wooden flower" is not even a flower or any normal part of a plant, but rather an abnormal bizarre-looking enlarged and brown woody growth produced by the branch of a tree in the Central American tropics that has been stimulated by the parasitic plant Psittacanthus, a member of the mistletoe family (Loranthaceae). The parasite induces the formations of striking and expanded growth faintly resembling a flower carved out of wood. A good example of a "wooden flower" is shown in **Case 839 of Hall 29.**

Misapplied popular names may thus become generally accepted as has been the case with many false Latin generic names. For example, we are accustomed to using geranium for pelargonium, gloxinia for sinningia, nasturtium for tropaeolum, and amaryllis for hippeastrum. As such, geranium, gloxinia, etc. are correct Latin names, though they pertain to other plants. In short, when we see or hear the popular name of a plant, it is wise to investigate it before accepting it.

HOW MUSEUM AND UNIVERSITY BENEFIT EACH OTHER

By D. DWIGHT DAVIS
CURATOR OF VERBRATE ANATOMY

The successful completion of a unique course in the cranial morphology of vertebrates marks another step in the plan to integrate the activities of the Museum and the University of Chicago.

The course, an advanced study of the evolution of the head among vertebrates, was planned to take advantage of the resources of the Museum. It was presented for the first time this year on an experimental basis. A class of eight students in the graduate school of the University met twice weekly at the Museum instead of in the University classrooms and laboratories. This arrangement made it possible for the students to make full use of the Museum's vast research collections and of the special knowledge of various staff members. It is planned to offer the course again next year.

Underlying the idea of Museum-University co-operation is the fact that no university, however large, can possibly cover all fields of human knowledge. This is especially true for the biological sciences, which are so enormously complex that no expert can be familiar with more than a very small corner of the whole field.

Many biological studies are impossible without collections of thousands of specimens from the four corners of the earth, which are referred to in much the same way as books in a technical library. Few universities can afford to underwrite such an enterprise, and collecting and storing such material logically falls to the larger natural history museums. But this division of labor between museum and university is functional only if such collections can be utilized by the university as well as by the museum. Otherwise the supposed division of labor is mere compartmentalization, which is the arch enemy of progress in science.

The head of a mammal or reptile is an amazingly complex thing, and its evolution was correspondingly complex. Many of the body's most important organs—the brain, the eyes, the ears, the organs of taste—are here crowded together in an intricate maze of details, infinitely more complicated than any device man has ever contrived. In most animals the mouth is used for self-defense, and to seize and hold food as well as to chew and swallow it. Some of the things that happened in the history of our own heads are almost unbelievable. The three little ear bones (the familiar hammer, anvil, and stirrup), for example, once were parts of the lower jaw and gills in our remote ancestors.

The histories of Greek and Roman civilizations, for example, are far better known than the history of our own heads. Yet by using the Museum's collections, a course in the history of the head is made a thousand times more graphic than any course in political and social history could possibly be. When the science student handles dozens of fossil skulls, it is as if a history student could visit dozens of entombed cities like Pompeii, under the expert guidance of a trained historian. When the science student dissects the head of an alligator, it is as if the history student could live for a time among the Australian Bushmen or the African Pygmies, with a sociologist to explain to him the structure of the primitive human society that he was visiting.

The advantages of this program are not all one way. Museum scientists are sometimes accused of living in an ivory tower because they are out of contact with the inquiring minds and challenging questions of student classes. Organizing ideas for presentation to student classes has long been recognized as an astonishingly effective way of showing up inconspicuous but important loopholes in our knowledge—and in the personal knowledge of the instructor. The research scientist who has been industriously making bricks finds himself called upon to assemble those bricks into an edifice, and the work of an architect is often more difficult than that of a brickmaker.

New and stimulating ideas for further research almost invariably result from such classroom experience. And in the case of the Museum some, at least, of these ideas will find their way into future exhibits too.

NATURE COURSE OFFERED FOR CAMP COUNSELORS

During May, the Museum is offering a nature course for camp counselors. There will be four sessions of the class, on Thursday evenings, May 1, 8, 15, and 22, in the Lecture Hall of the Museum. Sessions will be from 7 to 9 P.M. The West Entrance of the building—the only one to be open—will admit members of the class at 6:30 P.M.

This course includes brief information concerning the natural history of the Chicago region, suggestions for nature trails and camp museums, techniques for collecting and organizing nature materials, and projects for integrating nature work with camp activities.

All recreational leaders are welcome; there is no admission fee. For further information, call WABash 9410, Extension 43.

Following are the subjects for each session:

May 1—Introduction, Nature Trail, Geology
May 8—Animal Flyers (birds and insects)
May 15—Mammals, Reptiles, and Amphibians
May 22—Plant Kingdom

The classes will be conducted by members of the staff of the James Nelson and Anna Louise Raymond Foundation.

First Collections from Philippine Zoological Expedition Arrive

The first shipment of specimens from the Philippines Zoological Expedition, 1946–47, led by Captain Harry Hoogstraal, has recently been unpacked and contains numerous rare mammals not hitherto represented in the Museum's collections. This material was collected on Mount McKinley, Mindanao Island.

Most outstanding is a series of thirty wood shrews formerly known from but one specimen. Some are preserved in alcohol so that the soft parts may be studied. Skins and skeletons of the flying lemur are a welcome addition. This mammal is poorly named because it does not fly but glides and is not a lemur but is related to the insectivores. There are also four tiny squirrels, about six inches long, among the smallest known squirrels in the world.

Besides these are rodents, representing genera new to the collection, monkeys, bats, and deer. In all, there are about 180 specimens. The arrival of two other much larger collections is expected soon.

Chicago Natural History Museum

FOUNDED BY MARSHALL FIELD, 1893

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Members are requested to inform the Museum promptly of changes of address.

MR. DALLWIG COMPLETES A JOB WELL DONE

With his afternoon lecture on Sunday, April 27, 1947, Mr. Paul G. Dallwig completed his tenth season as the Layman Lecturer of Chicago Natural History Museum. Since the autumn of 1937, Mr. Dallwig has carried on his series of popular lectures on subjects within the scope of this Museum as a voluntary contribution to the work of this institution. His scripts, carefully prepared at his own expense, have been checked by other staff members of the Museum for scientific accuracy. It may interest the public to know that in the course of the preparation of his lectures Mr. Dallwig has accumulated a personal library covering the many fields of his interest in order to have available for reference at all times the works of acknowledged authorities in those fields.

The popularity of Mr. Dallwig's presentations is indicated by the fact that applications for the necessary tickets often have been received two months in advance and, in several instances, requests were made in the early fall for season tickets. In former years, Mr. Dallwig gave but one lecture each Sunday afternoon. In order especially to mark his tenth anniversary, however, he gave morning and afternoon lectures during November, December, January, March, and April, thus presenting ten lectures in his tenth season (1946–47). During his service, his audiences have totaled 34,090 persons.

Mr. Dallwig will take a well-earned rest during the season 1947–48, and plans for his lectures beyond that time have not been completed. The best wishes of the Museum go with him, as he terminates for the time being his splendid effort in behalf of this institution and of the people of Chicago.

CLIFFORD C. GREGG, *Director*

E. R. BLAKE PROMOTED

Effective May 1, Mr. Emmet R. Blake is advanced from Assistant Curator of Birds to Associate Curator of Birds, a position that has been vacant since the death of Dr. Charles E. Hellmayr in March, 1944.

EMMET R. BLAKE

Mr. Blake became a permanent member of the staff of the Museum in July, 1935. Previous to that time, however, he had taken part in two of the Museum's expeditions, to Venezuela and Guatemala. Mr. Blake was absent from the Museum in military service from June 15, 1942, until June 1, 1946, during which time he rose from enlisted status to the rank of captain in the Counter Intelligence Corps, serving in North Africa, Italy, France, and Germany. Besides five battle stars on his campaign ribbon, Mr. Blake was awarded the Bronze Star and the Purple Heart.

TWO STAFF PROMOTIONS IN FISH DIVISION

Mr. Loren P. Woods, a member of the Museum staff since 1938, and Assistant Curator of Fishes since 1941, has been promoted to the position of Curator of Fishes, effective from April 1. His first position at the Museum was as a member of the lecture staff of the Raymond Foundation.

In 1943, he was commissioned an ensign in the Naval Reserve and in war service was promoted to lieutenant (j.g.). After the war's end, while still in the Navy, he was assigned to work in Japan for the American Military Government in the investigation of fisheries. Late in 1946, Mr. Woods was granted a leave of absence from the Museum of two years to accept a temporary post as an associate curator of fishes in the United States National Museum, Washington, D.C. He is working there on the classification of shore fishes of the Marshall Islands, collected before and after the atomic bomb tests at Bikini.

Since Mr. Woods' departure on leave of absence, the Division of Fishes has been in charge of Mr. John W. Winn, Assistant, whose appointment as Assistant Curator of Fishes is effective from April 1.

STAFF NOTES

Mr. John W. Moyer, taxidermist in the Division of Birds before the war, has been appointed Chief of the new Motion Picture Division at the Museum. This division has a program of natural history and other Museum educational films. In the war, Mr. Moyer served as a Navy motion picture photographer in many parts of the world. . . . **Mr. Karl P. Schmidt,** Chief Curator of Zoology, attended the organization meeting of the American Institute of Biological Sciences in Washington, D.C., in April. The organization is to unify the many biological societies of the Americas. Mr. Schmidt also attended, as representative of the American Society of Ichthyologists and Herpetologists, the annual meeting of the Division of Biology and Agriculture of the National Research Council. . . . **Mr. Frank C. Wonder,** Staff Taxidermist, returned April 21 from his expedition to Trinidad, British West Indies, bringing a large collection of birds, mammals, reptiles, and amphibians for the Museum's systematic collections. He had been in the field since December 29. The collection he assembled is the first to be made in Trinidad by an American museum since 1893.

NEW MEMBERS

The following persons became Members of the Museum during the period from March 17 to April 15:

Associate Members

Joseph C. Belden, Jr., Isidore Horween, Michael L. Igoe, Dr. Nicholas H. Kern, O. R. Murphy, Kenneth W. Skarrn.

Sustaining Members

W. J. Stebler

Annual Members

Lawrence A. Appley, Harley R. Bucklen, Mrs. DeWitt Davis, III, Mrs. Jean E. Dougherty, C. Harold Eshbaugh, A. Ettlinger, Chester L. Glover, Austin T. Graves, Harry J. Graw, A. S. Gray, Louis Harpole, Christopher G. Janus, Byrne A. Jackson, Arthur S. Leonard, Moses Levitan, Dr. J. J. Litschgi, Robert R. Lockwood, Willard R. Matheny, Leo A. Mautner, Dr. C. O. Miller, Harry L. Mitchell, Oscar F. Modene, Harold A. Moore, M. W. Murray, Harold F. North, Benjamin Franklin Olson, William F. Patterson, MacMillan Priest, Miss Martha Jane Rogers, Eben T. Sabin, Miss Betsy Ruth Salk, Dr. Gabriel Saltarelli, Joseph R. Shapiro, Mrs. Albert F. Sperry, Miss Katherine J. Spiegel, Dr. Karl H. Tannenbaum, Mrs. J. M. Taussig, Dr. Willard O. Thompson, Claude Towne, Earle E. Vogt, Glenn D. Wade, Sheldon A. Weaver, William D. Wick, Mrs. Allan C. Williams, Jr.

USE OF AERIAL PHOTOGRAPHS IN FOSSIL HUNTING

By BRYAN PATTERSON
CURATOR OF PALEONTOLOGY

During recent years, large portions of the United States have been photographed from the air by such governmental agencies as the Department of Agriculture and the Army Air Forces. Whatever the main purpose for a particular aerial survey may have been, flood control, soil erosion, etc., geology in many of its varied branches has been one of the chief beneficiaries. Aerial photographs show physiographic and structural features, complement and supplement maps, and reveal areas suitable for investigation that might otherwise not be detected.

Since the aerial photographs are taken in overlapping series, the same patch of ground is seen from slightly different angles in

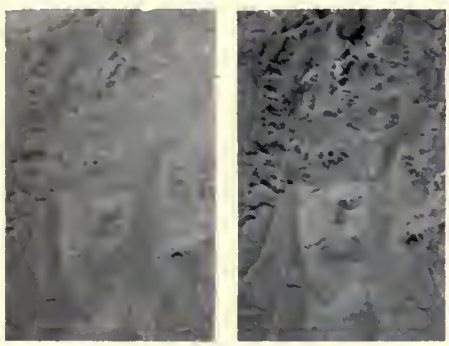

Fig. 1. A "STEREOSCOPIC PAIR"

Cut from two overlapping aerial photographs, covering approximately seven square miles of an area in trans-Pecos Texas worked by a Museum Expedition in 1946. To obtain the stereoscopic effect, focus the eyes beyood the page; the two images will merge into a central one that, when adjusted, will reveal the relief.

several photographs. If two of these are looked at through a stereoscopic device, the ground relief leaps into view, and the depths of gullies and the heights of hills and cliffs are clearly revealed (Fig. 1).

Individual aerial photographs and the aerial mosaics of larger stretches of country that are made from them are of inestimable benefit to those who hunt for the remains of fossil vertebrates. Many fossil-bearing formations are largely covered by grass, scrub, or woods, and rock exposures are few and hidden. A blind hunt for these might take fruitless weeks, but with aerial photographs in hand each one can quickly be located.

OLD TRAILS LOCATED

The success of the Museum's recent expeditions to Alabama, where the vertebrate-bearing Cretaceous deposits are for the most part obscured by vegetation, is due in large measure to the existence of an aerial survey made by the Department of Agriculture. Aerial photographs usually disclose old roads and trails that may enable the fossil hunter to extend his operations without too great an expenditure of time and effort.

Not only are aerial photographs of great help in the finding of fossils, but they are also invaluable in the precise recording of the localities at which they are found. Too often, localities that have been recorded in the literature are difficult or even impossible to relocate at a later date.

An imaginary but fairly typical case would be as follows: A field party that worked a certain area in 1910 reported that fossils were found in abundance in Antelope Draw and around the base of a butte known locally as Calamity Jane's Hat; a section of the strata exposed in Antelope Draw was published in the report. A party revisiting the area some thirty years later naturally wishes to head straight for these spots. The only topographic map of the region, published in the 1890s, shows neither of these place names. The residents have never heard of them either; they've nearly all moved in during the last fifteen years or so. Finally, one old-timer who has heard of Calamity Jane's Hat turns up, but he can't recall to which of several buttes it was applied, and as for Antelope Draw—he doesn't know the name at all! The party, therefore, has to start practically from scratch.

In an effort to avoid this sort of thing, careful collectors have, whenever possible, recorded the township and section in which their finds were made. In more settled areas, this works quite well; but in the

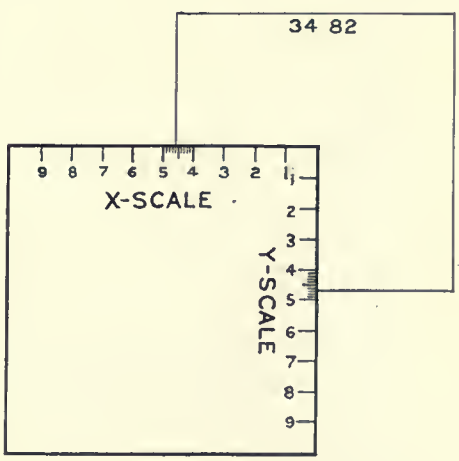

Fig. 2. LOCATION RECORDING DEVICE

The upper right corner of the card is upon the center of the isolated, nipple-shaped hill seen near the middle of Fig. 1. The data for this point are X 4.6 – Y 4.68, U.S.A.A.F. negative No. 34 82, Del Rio area, 9" x 9".

wilder places, corner markers, if set up at all, were often temporary makeshifts, such as a pile of stones or a rag tied to a stick, that disappeared soon after they were erected.

THE MODERN WAY

With aerial photographs available, these difficulties largely disappear. The collector can tell where he is on the ground, often to within a few yards, and can record the location of his finds in his notebook. He does this by means of the simple device shown in Fig. 2.

As aerial photographs come in standard sizes, usually 9" × 9" or 10" × 10", a square card is marked off in inches and tenths on the top and right-hand sides, the X- and Y- scales respectively, beginning at the top right corner. This corner is applied to the spot on the photograph that is to be recorded, the scales being parallel to the sides of the photograph, and the co-ordinates read off. These are then entered in the notebook, together with the serial number and size of the photograph and the name of the survey for which it was made.

By the use of such methods, greater precision is obtained and the troubles caused by unstable place names should soon be things of the past.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

Clever Hands of the African Negro. By Wilfrid D. Hambly. Associated Publishers, Washington, D.C., 1945. Pp. xiii+192, 73 illustrations, price $2.65.

In this delightfully written and well-illustrated book, intended for children, Dr. Wilfrid D. Hambly, Curator of African Ethnology in Chicago Natural History Museum, has presented a well-rounded account of African handicrafts in colorful and conversational style.

Into the central theme of African arts and crafts, Dr. Hambly integrates not only a general view of the geography and history of Africa and of African ways of life, but also an account of the aims, organization, and operation of a large natural history museum and of what happens on a museum expedition. The chapter on ivory carving serves as an example of the skillful way in which the reader's interest is directed from the central theme to matters of wide historical and geographical interest. Here, in addition to pertinent zoological facts about elephants, the reader is introduced to the history of man's use of elephants and of ivory from the Stone Age to the present and from China to Europe.

Altogether, this is a stimulating and informative book, and one that will hold the interest of ten-year-olds, older children, and their parents as well.

DONALD COLLIER
Curator, South American Ethnology and Archaeology

(See p. 8 for Museum Publications.)

NEW MUSEUM PUBLICATIONS

Popular Series—Botany, No. 26. *Tropical and Subtropical Fruits.* By B. E. Dahlgren. April, 1947. Pp. x+72, 68 illustrations (one in color). $0.50.

The latest number of the Museum's Popular Series (Botany, No. 26) to come off the press is a profusely illustrated account of the more important tropical and subtropical fruits of the Old and New World, prepared by Dr. B. E. Dahlgren, Curator Emeritus of the Department of Botany, with the assistance of Mr. Albert Frey, artist. Interesting facts about the discovery, introduction, and cultivation of many of these plants are recorded in the opening pages. Each fruit or group of fruits is illustrated, and significant information concerning its botanical characteristics, origin, uses, etc., as well as the scientific and common names in French, Spanish, Portuguese, Dutch, or Malay, is found in the accompanying descriptive text. The interested reader can find additional data by consulting the references given in the bibliography. An index to common and scientific names facilitates the use of this timely and attractive book.

The following technical publications have been issued recently by the Museum:

Fieldiana—Geology, Vol. 10, No. 4. *A New Pycnodont Fish from the Cretaceous of Arkansas.* By Louis Hussakof. Feb. 18, 1947. 6 pages, 1 text figure. $0.10.

Fieldiana—Zoology, Vol. 31, No. 9. *Notes on Amphibians and Reptiles of Michoacan, Mexico.* By Karl P. Schmidt and Frederick A. Shannon. Feb. 20, 1947. 24 pages, 1 text figure. $0.25.

Fieldiana—Zoology, Vol. 31, No. 10. *Two Races of the Bridled Titmouse.* By A. J. van Rossem. Feb. 28, 1947. 6 pages. $0.10.

Fieldiana—Zoology, Vol. 31, No. 11. *A New Race of Koklas Pheasant.* By Robert L. Fleming. March 13, 1947. 4 pages. $0.10.

Fieldiana—Zoology, Vol. 32, No. 1. *Phalangida from Tropical America.* By Clarence J. and Marie L. Goodnight. March 31, 1947. 58 pages, 30 text figures. $0.75.

Fieldiana—Zoology, Vol. 31, No. 12. *Some Neuropterous Insects from Szechwan, China.* By Nathan Banks. April 11, 1947. 12 pages, 5 text figures. $0.15.

Fieldiana—Zoology, Vol. 31, No. 13. *A New Kinosternid Turtle from Colombia.* By Karl P. Schmidt. April 11, 1947. 4 pages, 1 text figure. $0.10.

Fieldiana—Zoology, Vol. 31, No. 14. *The Malleus (Ossiculum Auditus) of the Anthropoid Apes.* By Walter Segall. April 11, 1947. 8 pages, 3 text figures. $0.10.

Fieldiana—Zoology, Vol. 31, No. 15. *Notes on Philippine Mosquitoes—XI—A New Species of Tripteroides.* By F. E. Baisas. April 11, 1947. 4 pages, 1 text figure. $0.10.

SPECIAL RAYMOND FOUNDATION PROGRAMS FOR SCHOOLS

The James Nelson and Anna Louise Raymond Foundation offers the following special programs in the Museum to the 5th, 6th, 7th, and 8th grades of the schools of the Chicago region during May:

Animal Flyers—May 7, 8, 10:30 A.M. Illustrated talk on birds and insects common in the Chicago region. Records of bird calls and songs.

Animal Adaptations—May 14, 15, 10:30 A.M. How animals adapt themselves to their surroundings and protect themselves.

The Earth's Green Mantle—May 21, 22, 10:30 A.M. The story of the plant kingdom, illustrated. Chicago region flora will be featured.

The Land of Chicago, Past and Present—May 28, 29, 10:30 A.M. The story of the Chicago region from prehistoric times to the present.

Suggestions for summer nature hobbies will be given.

Reservations may be made by teachers up to one week in advance. Call WABash 9410, Raymond Foundation. Admittance to the program will be limited to the number specified in request.

LECTURE TOURS IN MAY

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays; a schedule of these follows:

Fri., May 2—Bridges and Barriers—Likenesses and Differences Among Peoples (*Roberta Caldwell*).

Wed., May 7—Burial Customs (*June Ruzicka*).

Fri., May 9—Plants of the Past (*Marie Svoboda*).

Wed., May 14—Downtown Ornithology—City Bird Life (*Winona Hinkley*).

Fri., May 16—Mammals Through the Ages (*Lorain Farmer*).

Wed., May 21—Oriental Weavers (*Roberta Caldwell*).

Fri., May 23—People of the South Pacific (*June Ruzicka*).

Wed., May 28—Tales of the Spice Roads—Ancient and Modern Routes of Trade (*Marie Svoboda*).

Fri., May 30—*No tour.* (Memorial Day holiday—Museum open 9 A.M.–6 P.M.)

Visiting Hours Change May 1

Beginning May 1, summer visiting hours, 9 A.M. to 6 P.M., will go into effect, to September 1 (Labor Day).

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Dr. Henry Field, Cuernavaca, Mexico—a partially finished fish net with two netting shuttles and ball of fine cotton netting twine, Mexico.

Department of Botany:

From: Dr. Gregorio Bondar, Bahia, Brazil—72 herbarium specimens, Brazil; Dr. George D. Fuller, Chicago—152 herbarium specimens, Illinois; W. A. Archer, Belem, Brazil—a trunk section of Malouetia wood, Brazil; Dr. Paul Voth, Chicago—236 herbarium specimens of ferns, Mexico, United States, Hawaii, and New Zealand.

Department of Geology:

From: Eugene Richardson, Jr., Winnetka, Ill.—one mineral and 6 rock specimens, and one calcite crystal; Ralph J. Lofquist, Chicago—one specimen of lead ore; Houston Boyd, Lindsberg, Kan.—4 quartz rosettes, Georgia; Dr. Henry Field, Cuernavaca, Mexico—4 specimens of soil and sand, Mexico.

Department of Zoology:

From: Dwain Willard Warner, Ithaca, N. Y.—a shrew, Mexico; Walter L. Necker, Chicago—24 specimens of shells and worms, United States; Lincoln Park Zoo, Chicago—a golden eagle; Chicago Zoological Society, Brookfield, Ill.—a young camel and 12 birds; Sam Hinton, La Jolla, Calif.—7 night lizards, California; Dr. Clarence R. Smith, Aurora, Ill.—a snake, Illinois; N. L. H. Krauss, Summit, Canal Zone—2 snakes and 2 frogs, Canal Zone; Roger Conant, Philadelphia, Pa.—17 lizards, 2 snakes, and 42 frogs, Delaware, Maryland, and Virginia; Dr. Sidney Camras, Anchorage, Alaska—11 bird skins and 20 specimens of accessories for sea-otter group, Alaska and Aleutian Islands; R. M. Barnes (deceased), Lacon, Ill.—39 specimens of freshwater shells, United States; Dr. Henry Field, Cuernavaca, Mexico—32 specimens of shells, a frog, and a horned toad, Mexico.

Library:

From: Middle America Information Bureau (United Fruit Company), New York; New Hampshire Planning and Development Commission, Concord, N. H.; Dr. Henry Field, Cuernavaca, Mexico; Dr. Wilfrid D. Hambly, Chicago; Pioneer Hi-Bred Corn Company, Des Moines, Iowa; and United States Brewers Foundation, Inc., New York.

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A PALEOZOIC 'APARTMENT HOUSE' OF 400 MILLION YEARS AGO

By EUGENE S. RICHARDSON, Jr.
CURATOR OF INVERTEBRATE FOSSILS

THERE is a too-much used statement that there is nothing new under the sun; and usually someone adds that whatever it is that we call particularly up-to-date was familiar to the Chinese centuries ago. Recently added to the exhibits of invertebrate fossils in Frederick J. V. Skiff Hall (Hall 37) is a small skyscraper built millions of years before the Chinese had any (see Fig. 1). In fact, it was made even before there were any Chinese or other human beings, the work of some tiny corals called *Favosites*, which lived in the Silurian period, about 400 million years ago.

The animals who built this apartment house have never been seen, for they were of soft flesh and are long extinct, but they must have been very similar in appearance to modern corals, having a small sack-like body, with an opening, surrounded by tiny fleshy tentacles, at one end. Being so very soft, they built a protective limy coating for their bodies, leaving only the tentacles without. And, being so very tiny, it was to their advantage to live in colonies, or close groups, each *Favosites* touching its neighbors on all sides, a practice that made them six-sided. Their principal occupation, of course, was feeding, in which they weren't so very different from some people you could name.

To bring the minute animals and plants on which they fed into reach, all members of a colony probably moved their tentacles in unison, setting up a current in the sea water above them. When a suitable morsel happened along, the nearest coral closed his tentacles upon it and pushed it into his hollow interior.

As a by-product of digestion and respiration, each animal continued to deposit lime around his body, even after the protective coating was initially achieved. Of course, in time, the addition of lime would be a little too great, so that the animal would have to reach up over it to get at his food. Hence, each coral periodically pulled himself up to the top of his growing tube, built a little limy floor to rest on, and continued catching his microscopic wild game.

Because of the repeated moving up in the tubes, the animals ultimately found themselves on top of a structure that might be several feet high, though the animals themselves were no more than one-tenth of an inch long. In the nineteenth century, it would have been fashionable to draw a moral conclusion from this *per aspera ad astra* sort of activity, as Oliver Wendell Holmes exhorted his soul: "Build thee more stately mansions," after he had been contemplating a *Nautilus*. Perhaps now, however, we might compare the situation of the corals with the residents of a city apartment house, who gain a factitious social prestige from living on a higher story than someone else.

Fig. 1. HOUSING PROBLEM SOLUTION?
No, this is not a tall modern Lake Shore Drive apartment building; it is a coral colony from a Silurian limestone.

Reduced to the scale of our *Favosites*, and seen in the shallow water that corals inhabit, Chicago's impressive skyline array of tall buildings would be called a reef. It is interesting to reflect that in the Silurian period there was indeed a great reef in what is now the Great Lakes region, extending northward to Arctic climes. It was comparable in size and topography to the Great Barrier Reef, which now borders the Queensland coast of Australia, both being composed of many small reefs.

As in the modern city, skyscrapers form a conspicuous but numerically small part of the whole; so in the Paleozoic reef the *Favosites* type of coral was outnumbered by less spectacular forms. These were mostly Bryozoa, which look like corals, but are smaller; and many other kinds of sessile animals with limy shells added to the volume of the reef by their numbers.

The abandoned chambers in the lower part of the animal's tube became filled with crystalline calcite, even during the life of the colony, making the early structure a firm rock foundation for the living society above.

Since corals always live on the top part of their edifice, they have no need of windows, nor would windows profit them, because each tube is closely appressed to the next. The spots on the specimen, which give it the appearance of a windowed building, are little holes in the limy structure made for the accommodation of "buds." A bud is a young coral growing from the side of a parent and represents the way corals usually begin. If it is not crowded out, the bud will develop tentacles, sheath itself in a limy tube, and, breaking its connection with the body cavity of the parent, become a full-fledged coral. Though each parent member of the colony considered here produced a multitude of buds and carefully left open part of its own wall to give the young one a start, most of the infant corals were stopped against the solid wall of the next grown-up. But the holes remain, and look very much like windows (see Fig. 2, page 2).

It is remarkable that the "windows" form such straight horizontal rows; apparently the impulse to sprout a bud came almost simultaneously to every member of the group. If we could look inside, we would find that the "floor levels," where the limy

Fig. 2. CLOSE-UP OF THE 'WINDOWS'
Actually, traces of stifled coral buds.

platforms come, are almost even, too, in all the tubes. The similar level of floors and bud-holes leads us to conclude that there was a "community flesh" covering the top of the colony, as there is in many modern corals. This is a very convenient provision, for if one polyp (individual coral animal) has greater success in catching food than his neighbors, his nourishment is shared with the others, and if one detects a danger, a nerve-like impulse can be distributed through the colony and cause all its members to withdraw into their stony forts.

The soft parts of the animals are gone, but by observing the limy structure that remains and by comparing this with structures of present-day animals whose soft parts are known, we can form a probably reliable idea of the nature of these inhabitants of the Silurian sea.

ALGAE AND WATER SUPPLIES.

By HARRY K. PHINNEY
ASSISTANT CURATOR OF CRYPTOGAMIC BOTANY

The water supplies of most American cities are kept healthful by rigid regulation of the disposal of domestic and industrial wastes within the supplies' watershed. By close observation of the bacterial content of the water it is possible for the laboratory bacteriologist to note pollution and to check its source.

Although water-borne contagion can thus be kept at a minimum, many water supplies are occasionally afflicted and some are constantly endangered by the presence of members of a group of organisms quite distinct from the disease-producing bacteria. These organisms belong to the group of chlorophyll-bearing cellular plants generally and collectively known as algae, pond scums, water blooms, and the like. They are plants reproducing by means other than seeds and lack true roots, stems, and leaves. The menace of these plants is their nuisance value in producing unpalatable tastes and odors in the water.

Any algal species may grow so abundantly in a water supply that upon death and decomposition of the plant body it imparts an objectionable flavor to the water. Before and after death occurs, algae may also cause trouble in interfering with waterworks operation in clogging intakes, filter screens, and filter beds. In addition, certain species are noted for producing tastes and odors in the medium in which they grow as a normal metabolic phenomenon. Odors have been noted resembling both fresh and rotten fish, rotten wood, cucumbers, and musty grass.

CHEMICAL TREATMENT

Once the water has become unpalatable through any of these causes, the problem must be handled entirely as a chemical deodorizing process. This is accomplished in most waterworks at the same stage where chemicals are added to flocculate sediments or where chlorine is added to reduce the bacterial population. The two common agents employed for this purpose are chlorine and ammonia, either singly or together as ammoniachlorine.

If the control biologist periodically checks the algal content of the water and a sharp increase is noted or objectionable species appear, treatment should be undertaken to destroy the organisms before they reproduce in sufficient quantity to cause difficulty. This may require treatment of the lake or river that is the original source of the water or often the reservoir or storage basin into which the water is pumped.

The method of making population counts of free-floating organisms has been standardized and offers no obstacle to the aquatic biologist. It has been the accepted practice for more than forty years to use copper as an algaecide in such situations. The copper is applied as copper sulfate (blue vitriol) either in the dry state or as a concentrated solution. The calculation of the quantity of dry salt necessary to make the water to be treated a copper solution of the required strength must be made by a person having accurate first-hand information concerning the quantity of water to be treated and the biological and chemical content of that water.

BOTANISTS ASSIST

The problems of applying the algaecide are of an engineering nature and do not enter the realm of cryptogamic botany. Frequently, however, the identification of the organism creating the difficulty must be undertaken by a specialist who can make a positive determination and thus give the information necessary for adequate control. It is for this reason that cryptogamic botanists are called upon for their help.

Such inquiries are received not only from waterworks engineers but also from tropical fish fanciers whose aquaria become clouded and green, from owners of outdoor swimming pools, and from people whose property includes lakes and ponds all of which are quite susceptible to the algal plague. It is impossible for the botanist to attempt more than the identification of the causal organism and, possibly, furnish any information regarding its lethal threshold to copper.

Investigation in the laboratory and experience in the field have shown that most of the organisms that constitute a menace are susceptible to less than one part per million of copper. Some species have reported lethal thresholds as low as one-tenth part per million. Thus, accurate identification of the organism involved can result in savings by allowing the use of a minimum amount of copper sulfate. This is important because many fish species are relatively sensitive to copper and it is best to keep the dosage of copper as low as is possible.

SPECIFIC FORMS AND REMEDIES

Of the green algae, Cladophora,* Hydrodictyon,* and Spirogyra* clog filter beds and screens while Volvox, Dictyospherium, Pandorina, and Eudorina cause odor and taste. Here the differences in amounts of copper needed for eradication are great. They vary from one-tenth to ten parts per million. The diatoms* are frequent trouble makers, as they are responsible for both vile flavors and clogging of filters. The amounts of copper needed for their control vary from two-tenths to five-tenths parts per million.

Among the yellow-brown algae, Ceratium,* Dinobryon, Synura, and Uroglena are the most frequent producers of a fishy taste and it requires from two-tenths to five-tenths parts per million of copper to kill them.

Aphanizomenon, Anabaena, Microcystis,* and Rivularia (Gloeotrichia)* among the blue-green algae have been reported to clog filter beds and to cause odors. These forms can be eliminated or sharply reduced in number by adding copper sulfate in a quantity to give one-tenth to four-tenths parts per million of copper.

Occasionally the stoneworts (Chara) cause trouble because they form large masses and on decay give forth a sulphurous, rotten-onion odor. They are destroyed by copper in concentrations from one to five-tenths parts per million.

NON-CHEMICAL METHODS

Under certain circumstances in which the water is not put to domestic or industrial uses and the basin involved is small, it is possible to control the algae by other than chemical means. In small pools the masses may be removed by raking.

If no harm would ensue, draining the basin for a period of days will at least reduce the number of organisms but will not eradicate them. Shading small pools is often effective,

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*The forms singled out in the above discussion by an asterisk are represented in the glass model display of algae at the north end of Martin A. and Carrie Ryerson Hall (Plant Life–Hall 29).

as algae multiply best in warm water in strong sunlight. Reducing the nitrogen content of the water by removal of all organic debris and by cementing the bottom is another fair means of control.

The blue-green algae are reputedly quite sensitive to the nitrogen content of the medium and this method is most applicable when they are concerned. In general, it is best to know the identity of the trouble-making organism in order to determine the best treatment for it.

EXPEDITION TO SOUTHWEST HUNTS EARLY SITE

Dr. Paul S. Martin, Chief Curator of the Department of Anthropology, will leave Chicago this month for western New Mexico where he will continue archaeological researches for the Museum. He will be assisted by two staff specialists, Dr. John Rinaldo, Assistant in Archaeology, and Mr. George I. Quimby, Curator of Exhibits. Dr. Rinaldo has already left for the field.

In previous seasons, exhaustive work was carried on at an early site—called the SU village. Here were discovered evidences of an early civilization that archaeologists have called Mogollon (pronounced mugg-a-yown). Briefly, it may be characterized as simple, primitive, and unsophisticated. The people, as deduced from the skeletons found buried under the house floors, were similar in appearance to the modern Hopi or Zuni Indians. They lived in pit houses, made undecorated pottery, used the crudest kind of stone tools, existed mostly on seeds, nuts, berries, and products of the chase, and perhaps did a little farming on the side. This Mogollon civilization was different from that of the Pueblo Indians and of the Hohokam Indians of southern Arizona.

SEEK AGE FROM WOOD

The age of this SU village is not yet positively known, although the burned roof beams are being studied at the Laboratory of Tree Ring Research at Tucson. But Dr. Martin's considered guess is that this village was occupied about the year A.D. 500.

Two reports have appeared on the results of the work at the SU site, and the third and final document is in press now. In them, Dr. Martin has explained the significance of the various specimens found and has synthesized the results of the expeditions.

The next problem is to trace the origin and development of the people of the SU village. This calls for Dr. Martin and his associates to undertake what is known as an "archaeological survey." On foot or on horseback, the archaeologists cover many miles of territory in order to locate what might be a village earlier than the SU village and perhaps ancestral to it, or a site that is later than the SU village and perhaps inhabited by descendants of SU people. Several such sites may be encountered. They will be excavated during this and following summers to obtain evidence for tracing the origin of the Mogollon civilizations.

The survey work requires special training and experience. About two months will be required to cover the area of interest. Mr. E. B. Sayles, Curator of the Arizona State Museum, leader of the survey and an expert in this field, has already begun the task. He is being assisted by Dr. Rinaldo.

HOW RUINS ARE SPOTTED

As the survey has not yet been completed, it is not possible at this time to give any report on the results obtained from it. But it is hoped that an early village will be found —one that might date from about A.D. 300 or earlier. When such a village is located, it will be thoroughly excavated for the Museum.

With experience and training, one can spot the ruins of abandoned village or camp sites by the presence of one or more of the following traits: broken pieces of pottery, broken stone implements, chips of stone, fragments of bone tools, saucer-like hollows (about 14 feet in diameter), and traces of walls.

In the event that no early, pre-pottery village is located, investigation of a village occupied after A.D. 500 will be undertaken. There is equal interest in the developments leading up to the SU culture and those that stemmed from it.

Dr. Martin and his associates will employ five or six local laborers and will be in the field until the middle of September.

'OIL IN VENEZUELA' PHOTO SHOW AT MUSEUM, JUNE 5-27

An exhibition of photographs documenting the oil industry of Venezuela will open in Stanley Field Hall of the Museum on June 5 and continue through June 27. Entitled "Oil in Venezuela," the exhibition was prepared by Standard Oil Company (New Jersey) for the Council for Inter-American Co-operation, Inc., and is to be presented in twenty cities throughout the United States. The Pan-American Council of Chicago is co-sponsor of the exhibit here.

The ten large panels of photographs provide a dramatic record of the tropical oil country of Venezuela with its derricks rising from Lake Maracaibo, where the Creole Petroleum Corporation, a New Jersey Standard affiliate, is drilling for oil beneath water as deep as 60 feet. The panels also portray the refineries and their pipelines, the types of native workers and modern housing projects, and schools and hospitals constructed for the people of the oil communities. All photographs are accompanied by labels telling essential facts and will be exhibited in individually lighted cases.

All photographs in the exhibition were taken by Mr. John Vachon, who is well known in his field through his work for Farm Security Administration, Office of War Information, and United Nations Relief and Rehabilitation Administration.

Photo by Vachon—Standard Oil Co. (N. J.)

TIA JUANA OIL FIELD, LAKE MARACAIBO

Drilling in this Venezuelan area is done in 60 feet of water. (One of the photographs to be exhibited June 5-27.)

2 MILLION VOLUMES IN MUSEUM LIBRARY BY A. D. 2022?—'THE DOCTRINE OF SUFFERANCE'

By CARL W. HINTZ
LIBRARIAN

THE past few decades have witnessed a tremendous increase in size of the book collections of libraries throughout the world, and particularly in the United States. The problem of housing, organizing, and administering large collections has engaged the attention of many people—librarians and non-librarians alike—and proposed solutions have ranged from regional storage warehouses for the less used material to the reduction of books photographically to the size of catalogue cards to save space.

The latest warrior to enter the lists is Garrett Hardin, a bacteriologist, at Santa Barbara College. His article, "The Last Canute," which appeared in the *Scientific Monthly* for September, 1946, is a beautiful piece of satirical writing, which follows the Swiftian method of making a point by exaggeration. It is built upon the theme of a wealthy man who left $20,000,000 to each of four university libraries on condition that for each ten dollars they applied for, one book had to be removed from the stacks forever and destroyed. The will was broken because of some smart alecks at Harvard, and the four universities got the money without any strings attached. Librarians fare rather badly at Mr. Hardin's pen, as he says that "libraries must have a well thought out system for getting rid of books, as they have for acquiring them. This seems obvious enough—to everyone but the librarian."

This proposal that books be evicted from the library is elaborated upon in a second article by Mr. Hardin: "The Doctrine of Sufferance in the Library," in the April, 1947, issue of *College and Research Libraries*. His thesis here is that all books shall be placed on the defensive after a certain period of time. Unless their retention can be justified, out they go. "No book remains in the library save on sufferance. This must be the basic principle governing libraries, at least college and research libraries."

SHORT LIFE FOR BOOKS

If the system Mr. Hardin outlines were adopted, he predicts that, in a college library, for instance, most textbooks would go out at the end of ten years, and the majority of monographs and reviews in the field of science, at the end of twenty years. Even original research papers could be destroyed after one hundred years or at the most two hundred, on the assumption that it is easier to make the discovery anew than it is to exhume it from the library after a lapse of many years. Mr. Hardin cites the classic example of Mendel's work remaining unknown for forty years, during which time at least three other investigators had independently reached the same results.

Granted that we are faced with a tremendous flood of printed matter, it seems that some of the assumptions on which the alarmists base their case may be critically examined.

The prize example is cited in "The Last Canute"; namely, that if Yale University Library continues to grow at the same rate as it has in the past, it will have approximately 200 million volumes by A.D. 2040. It is true that research libraries have doubled every sixteen years on the average, but it seems questionable whether this rate of growth will continue. The realization that libraries are important to research, plus the development of new fields since the turn of the century, led in large measure to the tremendous increase in the size of book collections, in part, at least, made up of material published many years earlier. Eventually, the backlog of desiderata will be overcome—either because it has been acquired or because a supply is no longer available. When and if this happy stage is reached, libraries will be faced primarily with current production.

HOW MUSEUM LIBRARY GROWS

It is interesting to apply these figures to Chicago Natural History Museum Library in terms of its past and projected growth. According to the Annual Report of the Director for 1894–95, the Library was organized in March, 1894. By October 1 of that year, 6,520 items had been entered in the Accession Book.

It is interesting, though dangerous, to speculate on the number of volumes of research interest published annually in the world. The Library of Congress, the largest American library, received a total of 2,984,619 pieces of new material during the fiscal year 1944–45, and disposed of, or consolidated into volumes in the course of binding, 648,326 pieces, leaving a net gain of 2,336,293 pieces. Of the total number of items received, 572,821 were classed as volumes and pamphlets. The remainder were unbound serial parts, unbound newspaper issues, maps, microfilm, motion picture reels, recordings, etc. Admittedly, the Library of Congress does not acquire a copy of all publications of research interest, but included in its total are many publications not of research value.

If we attempted to construct a rough figure in volumes for unbound serial parts and newpaper issues, we would arrive at a total of 650,000 volumes and pamphlets added annually. Multiply this by 100, and we would have 65,000,000 volumes by A.D. 2045—a staggering figure, but considerably less than the 200,000,000 volumes projected for Yale. Similarly, the 650,000 volumes added annually seem like a drop in a bucket compared with the presumptive 5,500,000 volumes that Yale would be adding from A.D. 2022, to 56,000. In other words, in order to double in size every sixteen years, the annual rate of acquisitions must constantly increase.

Actual Growth	Annual Additions	Doubling Every Sixteen Years	Annual Additions
Oct. 1894— 6,520		1894— 7,000	
	2,091		438
1910— 39,980		1910— 14,000	
	1,716		825
1926— 67,450		1926— 28,000	
	2,650		1,750
1942—109,850		1942— 56,000	
	2,950		3,500
1946—121,650		1946— 70,000	
		1958— 112,000	7,000
		1974— 224,000	14,000
		1990— 448,000	28,000
		2006— 996,000	56,000
		2022—1,992,000	

This table shows the actual growth of the Library as compared with the figures to be obtained from the "doubling every sixteen years average," together with the number of items added or to be added each year.

The table herewith shows actual growth has outstripped the average considerably, as we are now about where we ought to be in 1960. However, from this point on, the number of volumes that we would need to acquire annually to keep doubling every sixteen years rises sharply. Between 1958 and 1974, for instance, it increases to 7,000 yearly; from 1974 to 1990, to 14,000; from 1990 to 2006, to 28,000; and from 2006 to 2032 on in order to have its 200,000,000 volumes by A.D. 2040.

EVER INCREASING ACQUISITIONS

What other evidence is there to support the thesis that the rate of growth will slow down? In our own case, for instance, much of the material that we are now acquiring antedates the founding of this Library. Eventually we shall have filled in the gaps

LIBRARIAN OF THE FUTURE?
(Cartoon by Peggy Collings Brown)

in the collection or the material will no longer be available. This is not an indication that our rate of acquisitions will drop. Rather, it should increase with particular emphasis on securing current material and more complete coverage, so that it will not be necessary fifty years from now to go back in order to remedy deficiencies. However, it seems doubtful if we will ever reach a stage where we would be adding enough volumes each year to meet the figure under the doubling-every-sixteen-years formula.

What of the doctrine of sufferance? In our case, the older material is frequently referred to. Hardin's thesis that it is simpler to rediscover facts independently after a long lapse of time ignores the law of economy by suggesting that work already done should be duplicated rather than utilized. The fact that Mendel's work was not known until forty years later is a situation that would not reoccur, in all probability, in these days of research libraries and abstracting and indexing services. Furthermore, the suggestion that older material, which is presumably no longer useful to an experimental scientist, be removed from the stacks and forever destroyed is a denial that the history of science is important as a subject in its own right. Any humanistic aspects that the sciences possess would be ignored in favor of a stark utilitarianism.

Furthermore, the argument that unrestricted growth will lead to a situation where librarians will outnumber every other group in the population is ridiculous. Before books can be added to a library, they must be written and published. Closely allied to the question of speculating on the number of research publications is the fascinating, though perhaps equally unanswerable one of the number of people engaged in writing them. For if libraries are to double in size every sixteen years, it is implied that the production of publications must constantly grow. If publications double, it is reasonable to assume that the producers of those publications will increase in number. In other words, Mr. Hardin's character who says, "If everyone is cataloguing books who on God's green earth is going to write them?" might well be paraphrased to read: "If everyone is writing books, who is going to buy, read, and care for them?" The need for thousands of cataloguers will be brought about only by the existence of many more thousands of writers. Perhaps birth control at the source rather than euthanasia at the end is the answer.

Paleontology Field Trip

The Museum's 1947 Paleontological Expedition to western Alabama, after five successful weeks in the field, returned to Chicago on May 15. Mr. William Turnbull, Preparator in Paleontology, was in charge. He was assisted by Mr. C. M. Barber. In addition to several fine fossil turtles, mosasaurs, and whales, the most exciting specimen is an almost perfectly preserved fish. Nearly all of the specimens were from the Selma Formation of late Cretaceous time, although the whales and a few others were found in the Jackson Formation of the Eocene epoch.

Technical Publications Issued

The following technical publications were issued by the Museum during the last month:

Fieldiana—Geology, Vol. 11, No. 1. *The Family Diadectidae, and Its Bearing on the Classification of Reptiles.* By Everett Claire Olson. April 23, 1947. 54 pages, 8 text figures. $ .60.

Fieldiana—Geology, Vol. 10, No. 5. *Redescription of Taphrosphys Olssoni, a Fossil Turtle from Peru.* By Rainer Zangerl. April 30, 1947. 12 pages, 4 text figures. $ .20.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

The Ancient Maya. By Sylvanus Griswold Morley. Stanford University Press, 1946. Pp. xxxii+520, 152 illustrations, price, $10.

The ancient Maya produced one of the most fascinating civilizations of the New World. Fittingly enough, Morley's book on the Maya is as outstanding as the civilization about which it is written. The book is the most up-to-date synthesis of the detailed knowledge that archaeologists have extracted about the Maya, their history, and their intellectual and artistic achievements.

Also, now that the picturesque Maya country of Yucatan and Guatemala is so easily accessible by air, the book is of value in providing an essential background for all those whose interest in native America impels them to visit the scene of the ancient ruined Maya cities and to see the Maya people of today.

Dr. Morley, an associate of the Carnegie Institution of Washington and one of the most eminent of Middle American archaeologists, has devoted a lifetime to the study of the Maya. In his book, he treats in detail the origin, rise, and decline of the Maya civilization and the final conquest of the Maya by the Spanish in the 16th century. He also gives a concise picture of the natural setting in which the Maya lived and describes the focal points about which Maya life revolved.

One learns of the central position that maize agriculture held among the Maya and of its intimate relation to religion and ceremony. There are excellent chapters on the system of hieroglyphic writing and on Maya mathematics and astronomy. Achievements in architecture and the arts are clearly described. Interesting sections are also devoted to various aspects of everyday life and to the structure of Maya government and social organization.

One of the book's most attractive features is the very large number of excellent illustrations and text figures. A number of explanatory tables further enhances the volume. The well-known French artist, Jean Charlot, has provided a colorful jacket. Finally, the Stanford Press is to be complimented on the over-all makeup of the book, the excellent type, and the fine quality of the paper.

ALEXANDER SPOEHR
Curator of Oceanic Ethnology

Models of a record-size squid and an octopus are suspended from the ceiling in Hall M (Lower Invertebrates).

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Members are requested to inform the Museum promptly of changes of address.

STAFF NOTES

Dr. Paul S. Martin, Chief Curator of Anthropology, and two of his associates, **Mr. George I. Quimby**, Curator of Exhibits, and **Mr. Donald Collier**, Curator of South American Ethnology and Archaeology, attended the meetings last month of the Central Section of the American Anthropological Association held at the University of Michigan at Ann Arbor. Mr. Quimby presented a paper on the Death Cult among the prehistoric Indians of the Southeastern United States, and Mr. Collier presented one on the Indians of South America. . . . **Mr. Colin C. Sanborn**, Curator of Mammals, visited museums in Cambridge, Mass., New York, Washington, D.C., and Pittsburgh last month to make comparative studies of South American mammal specimens. . . . **Mr. Karl P. Schmidt**, Chief Curator of Zoology, attended a meeting of a subcommittee of the Pacific Science Board last month in Washington, D.C., to discuss current active projects for research in the Pacific. The Museum shares in the major project for an anthropological survey of the Pacific islands under American control through the work of **Dr. Alexander Spoehr**, Curator of Oceanic Ethnology, currently on an expedition in the area. . . . **Dr. Rainer Zangerl**, Curator of Fossil Reptiles, left May 1 on a field trip to the Eocene deposits in Wyoming. . . . The resignation of **Dr. C. Martin Wilbur** as Curator of Chinese Archaeology and Ethnology as of May 31, is announced. Dr. Wilbur joined the staff of the Museum on October 1, 1936. He has been on leave of absence since April 7, 1943, for service with the Office of Strategic Services of the War Department, and later with the State Department. On completion of his present assignment in government service, Dr. Wilbur will join the faculty of Columbia University, New York.

Reptile Study in Southwest

During the last week of June, Mr. Clifford H. Pope, Curator of Amphibians and Reptiles, will leave for western New Mexico where for about two months he will make a survey of the reptile and amphibian life of the southern border of the high plateau that covers most of New Mexico and much of Arizona. Special attention will be paid to the altitudinal distribution of lizards on the plateau and in mountains lying to the east and west.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Dr. Harold S. Bayless, Chicago—the robe of a Maori chief, Hawkes Bay tribe, New Zealand.

Department of Geology:

From: Kent Jones, Joplin, Mo.—2 fossil pelecypods, Texas; Glen L. Evans, Austin, Texas—a fossil gastropod, Texas; Michael Chappers, Chicago—a specimen of brown fluorite and a Pleistocene conglomerate, Ohio; Charles E. Mohr, Director, Academy of Natural Sciences, Philadelphia—10 photographs of exhibits in the Hall of Earth History at the academy; Eugene S. Richardson, Jr., Winnetka, Ill.—169 specimens of invertebrate fossils, Pennsylvania and New Jersey.

Department of Zoology:

From: Boardman Conover, Chicago—a reproduction of a Labrador duck; Chicago Zoological Society, Brookfield, Ill.—a Mandarin duck, China; Dr. Henry Field, Cuernavaca, Mexico—51 specimens of shells, Mexico; Ross Allen, Silver Springs, Fla.—401 specimens of reptiles and amphibians, Florida and Gulf States; N. L. H. Krauss, Honolulu, Hawaii—a snake, Hawaii.

Library:

From: Commissioner for Archaeology and Anthropology, Khartoum, Egyptian Sudan; Col. Clifford C. Gregg, Valparaiso, Ind.; Dr. Carl L. Hubbs, LaJolla, Calif.; Dr. Henry Field, Cuernavaca, Mexico; Eugene S. Richardson, Jr., Winnetka, Ill.; Carl Colby, Loyal, Wis.; P. Coremans, Brussels, Belgium; and Boardman Conover, Dr. Theodor Just, Rupert L. Wenzel, and Anthony Mazur, of Chicago.

Philippine Expedition Progress

Reports of successful work by the Museum's Philippine Zoological Expedition, which is staffed in part by collectors from the former Philippine Bureau of Science, continue to arrive from the field, as well as notable collections. The expedition, under the direction of Captain Harry Hoogstraal, is continuing work on the interesting island of Palawan. This long narrow island lies between Borneo and the Philippines, and its animal life, almost entirely unlike that of other Philippine islands, is closely related to that of Borneo.

Active studies of the Philippine collections received from Mindanao, the largest of the southern Philippine islands, are under way. The use of Filipino members on the expedition constitutes co-operation with the new Philippine National Museum.

Collection From Trinidad

An important addition to the South American collections of the Museum has resulted from the collections made in Trinidad, British West Indies, by Staff Taxidermist Frank C. Wonder, whose return from a four-month expedition to that island was reported in the last issue of the BULLETIN. Since that report, Mr. Wonder's collections have arrived safely at the Museum. Mr. Wonder concentrated on collecting mammals, reptiles, and amphibians, but he also assembled representative birds.

Trinidad is the type locality of many species of animals, and fresh specimens from the island accordingly are essential to the understanding of the distribution of South American species. Mr. Wonder was aided by Dr. E. M. Chenery and Mr. J. C. Cater of the Forestry Department of Trinidad.

NEW MEMBERS

The following persons became Members of the Museum during the period from April 16 to May 15:

Associate Members

A. Forrest Steepleton, Mrs. Robert Tarrant.

Sustaining Members

Gerhard Lessman

Annual Members

H. B. Barber, Lawrence H. Barrett, George L. Barrowclough, Miss Helen Boyd, Edward J. Burnell, Lynton W. Caldwell, G. Murray Campbell, Horace M. Carleton, Dr. Sam S. Chrisos, Stuart O. Fiedler, Mrs. D. C. Franche, III, Carl R. Gray, Jr., Kenneth M. Henderson, J. L. Holloway, Fred Jacky, Ray Kaspar, I. C. Keller, Miss Clara R. Lacey, Arthur G. Leonard, Jr., John D. Leonard, Dr. Aquil Mastri, Claude R. Miller, Myron T. Monsen, Robert R. Owen, Paul M. Plunkett, Mrs. S. Austin Pope, John V. Sandberg, Warren H. Sapp, Jr., Ralph W. Schalla, T. P. Stathas, Donald J. Walsh.

LECTURE TOURS IN JUNE

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays; a schedule of these follows:

Wed., June 4—Sun Journey—Southwest Indians (*June Ruzicka*).

Fri., June 6—Edible Wild Plants in the Chicago Region (*Marie Svoboda*).

Wed., June 11—The Races of Mankind (*Miriam Wood*).

Fri., June 13—Animals of Tropical Climates (*Lorain Farmer*).

Wed., June 18—Plants to Beverages (*Marie Svoboda*).

Fri., June 20—Your Trip to the Rockies—The Story Behind the Mountains (*Winona Hinkley*).

Wed., June 25—Denizens of the Deep (*Lorain Farmer*).

Fri., June 27—Your Trip to the Rockies—Animal Life of the Region (*Winona Hinkley*).

PLANTS AS SOURCES OF RUBBER

By LLEWELYN WILLIAMS
CURATOR OF WOOD TECHNOLOGY

The use of the milky exudation of certain plants by the natives of tropical America, and elsewhere, has been known to explorers and naturalists for centuries. History relates that when Columbus, on his first voyage to the Americas, reached the island of Hispaniola he found a group of Indians playing with balls that bounced. At the beginning of the 17th century, Pietro Martyre d'Anghiera, chaplain to the court of Ferdinand and Isabella, told how the Aztecs played with balls made "from the juice of a certain herb."

FIRST RAINCOATS

When the Spaniards arrived in Mexico, they established the practice of dipping capes into latex to waterproof them. Early explorers of the Amazon likewise reported that the primitive forest dwellers of the region prepared waterproof garments, pouches, rubber vessels, and so forth from an elastic substance of plant origin, which they called "cahuchu."

Years later, Charles-Marie de la Condamine, the French scholar and explorer, furnished descriptions of the uses and preparation of rubber, samples of the material, and details of the botanical characteristics of the trees tapped by the Indians of equatorial America.

Everyone is familar with the common milkweed, or the rubber plant frequently grown in homes—when the stem is broken, a milky juice exudes. Milk or latex is characteristic of hundreds of plants, especially those of the Spurge, Dogbane, Mulberry, Nettlewort, and Sapodilla families.

LIFE FUNCTION UNKNOWN

This latex has its origin in a system of capillary vessels or cells found in the first-formed or primary tissue of the stems, in the secondary tissue in the underlayers of the bark, and sometimes in the sapwood of the trunk and branches. Its function in the growth and life of the plant still remains unsolved. When seen under the microscope, this milky juice has the appearance of minute oily globules of variable size and chemical content, depending upon the plant from which the latex is obtained.

Though comparatively rare in temperate regions, rubber-yielding plants are exceedingly common in the tropics. Many of the largest trees in the humid forests of Central and South America, Africa, Asia, and the Malay Archipelago exude a milk-like substance when the bark is cut or damaged or when the leaves and twigs are torn or snapped. The best known are various species of *Hevea*, widely distributed in northern South America, especially in the Amazon and upper Orinoco regions; species of *Sapium*, in Brazil, Colombia, and Venezuela; Ceará rubber tree (*Manihot glaziovii*) and Mangabeira (*Hancornia speciosa*), in eastern Brazil; species of *Clitandra*, *Carpodinus*, *Landolphia*, and *Funtumia*, in Africa; and the so-called India rubber tree (*Ficus elastica*), in India, Burma, and Malaya.

RUBBER GATHERERS' CAMP

On the upper Orinoco River, Venezuela. In foreground are balls of crude rubber prepared by smoking the latex over poles. (Photo by Curator Williams.)

The most rubber and that of highest quality comes from the Pará rubber tree (*Hevea brasiliensis*), native of the Amazon valley. Late in the last century it was introduced into the Far East, where it has been so extensively propagated that until recently the Far East furnished the world's chief supply of rubber.

The method of extracting the latex and the preparation of rubber vary according to the plant. In some instances the trunk and branches are tapped; in others the entire plant is macerated. The liquid is solidified by the application of heat or the addition of such chemical agents as acetic or phosphoric acids or alum.

In the Amazon Valley and adjacent regions, rubber trees are tapped during the dry season. The tappers explore the forest and open paths to suitable trees. A vertical incision is made with a special knife up to a height of three or four feet. A lateral cut, at an angle of 45 degrees, is opened, leading to the vertical channel. Subsequent incisions are opened parallel with the original lateral cut, usually on alternate days. The latex begins to flow immediately and is caught in a receptacle fastened to the trunk. After a few hours the contents of all the cups are transferred to a larger vessel and taken to the main camp.

The next step is to convert the still liquid latex into solid rubber. A fire is lighted, using certain species of hardwoods or palm nuts, to produce a dense smoke. Latex is poured over a pole or paddle and held over the smoke. Almost instantly the heat causes the latex to dry or coagulate, forming a thin layer on the pole or paddle. More latex is added and then smoked. The process is repeated until a large ball, weighing up to 100 pounds or more, is formed. When fresh, rubber is of a golden brown color, but it gradually becomes dark, almost black, on contact with moisture or on exposure to air and sunlight.

PROCESS ON PLANTATIONS

On plantations it is customary to coagulate the liquid with chemical agents and to press the solidified mass into thin sheets, which are afterwards placed for several days in a smoke-filled chamber.

Despite considerable research and great progress made in recent years in the synthetic industry, wartime experience indicated the manifest superiority of natural rubber over synthetic substitutes in the manufacture of certain articles, especially those subject to friction or requiring endurance.

An exhibit showing trunks of several rubber-yielding trees, various types of rubber, and steps in the preparation of Pará rubber is on display in Cases 605 and 607 in Hall 28.

Museum to Be Host to Librarians

The Special Libraries Association will hold its 1947 convention at the Drake Hotel, June 9–13, and its Museum Group is scheduled to meet at Chicago Natural History Museum on June 13 at 2:30 P.M. A brief tour of the building is planned, followed by a talk by Chief Curator of Zoology Karl P. Schmidt on "Bibliographical Foundations of Museum Research" and a description of the library and its activities by Librarian Carl W. Hintz.

'PLEASE PASS THE SALT' HAS A SWEET SOUND IN AFRICA

By WILFRID D. HAMBLY
CURATOR OF AFRICAN ETHNOLOGY

"PASS the salt, please." African Negroes, especially those of the interior, and Pygmy tribes as well, would be most happy if the above modest request could be continually made with hope of compliance. For even today, after considerable opening up of Africa, salt has a high value. During the Frederick H. Rawson–Field Museum Expedition to Portuguese West Africa, led by the writer, gifts of salt were welcomed, and occasionally the commodity was used in exchange for objects of Negro manufacture, although money has been circulated among native tribes for many years. The Ovimbundu tribe of Angola preserve locusts in a mixture of salt and fat. In the early centuries of European trade with Negro Africa, salt was one of many objects, such as brass wire, cowrie shells, beeswax, ivory, and copper ingots, each of which had a standardized purchasing power and a definite value in relation to other forms of currency.

TRANSPORT OF SALT IN WEST AFRICA

The blocks these tribesmen carry are natroo, a salt used in the drinking water of domestic animals in the Lake Chad region.

It is stated occasionally that African people prefer salt of their own manufacture to the more purified forms that are imported from Europe. Be this as it may, there still exist very crude methods of obtaining adulterated salt from ashes that result from the burning of carefully selected plants. The usual method is to soak the ashes in water, then to strain them, and finally to evaporate the water.

SEA-WATER SALT

As far back as the year 1775, Lieutenant J. Matthews witnessed the manufacture of salt from sea water, by Negroes of Sierra Leone, West Africa. He describes marshy plains that were overflowed by the sea twice a year, and when the resulting deposit of mud had hardened after the high tides had receded, cakes of the saline earth were collected by slaves. "The mud is dissolved in water in large earthen pots; when the water is sufficiently saturated with salt it is boiled in shallow brass pans, and yields an excellent salt, which, although not so white as that procured from sea water only, by the same method of boiling, is preferred to it by the natives."

At the present day, near Lake Mweru in east Africa, the making of salt is accompanied by important ritual. A local priest inaugurates the work by spending several days alone at his own salt diggings, and on his return he erects a small spirit-hut near a sacred tree. In the middle of the floor of this hut a cup of salt is placed. Formerly, and even today if European supervision is lax, a human victim is sacrificed, and the ground is blessed by the sprinkling of human blood. The whole of this procedure is to solicit the ancestral spirits, for the essence of Negro religion is a belief that the dead are able to influence even the most trivial events in the lives of the living. A division of labor is followed in the preparation of salt; men bring firewood, children carry the salt earth and water, while women take care of the evaporation and collection of the resulting salt. When the water containing salt earth has nearly boiled away, women scoop the salt with a cup and pour it into receptacles made of bark. The salt is intended not merely for personal use, but also for trade on a quite large scale with neighboring villages.

6000 PER CENT PROFIT

Negroes of west Africa have, since very ancient times, received cakes of salt from the mines of Bilma and Tigguida in the interior Sahara desert. At the present day one may see salt cakes from the Sahara on sale in markets hundreds of miles from the place of their origin. In Hall D (Case 21) are pieces of salt cake which were purchased in Nigeria, West Africa by the Frederick H. Rawson–Field Museum Expedition to that country. Salt which is worth a penny in Bilma is worth sixty times as much at the end of a long caravan journey.

In Negro Africa, as well, there are stories concerning a commodity so highly esteemed. The Bushongo of the southwest Congo region have a legend that describes the discovery of salt as an appetizer. A woman whose leg had been wounded while escaping from a village fire treated the wound with ashes of plants that had been burned in the conflagration. Later she sucked the wound to ease the pain, and so discovered that the ashes had a pleasant taste. Some time later the discovery was made that these ashes, if soaked in water, would yield a satisfactorily briny substance.

MURDER INDEMNITY PAID IN SALT

One curious use of salt in payment of a fine is recorded by a traveler in a village of central Africa, about forty years ago. A murder had been committed and, according to custom, the community in which the murderer lived was responsible for paying the blood-money. The chief of this village went around on an appointed day and collected from each of his subjects two cupped handfuls of salt. This was pooled to form payment for the life taken.

Negroes who keep cattle, and there are many such tribes, although other Negro tribes are wholly agricultural, have to find salt for their herds as well as for themselves. Among the Suk tribe of northeast Africa, cattle are driven to a salt lick once a month on the first appearance of the new moon. There is a belief to the effect that cattle must not proceed if the moon is obscured, for if they do a stomach disease may result.

A well-known ethnologist said of the Bakitara tribe of northeast Africa, that should the rain-makers fail to bring rain, they were punished by being made to eat a meal cooked with a large amount of salt. They then had to sit perspiring in the sun. Nobody believed that the rain-makers were incapable; they were thought to be stubborn. The sacred office appears to be one that might well be difficult to fill, for should the magicians make too great a downpour they were compelled to drink excessive quantities of water; or a capricious king might immerse them and appoint guards to push them under when they arose to breathe.

Reptile Collecting in Texas

Mr. Karl P. Schmidt, Chief Curator of Zoology, his son, John, and Dr. C. C. Liu, engaged in research at the Museum on a State Department fellowship, have returned from a brief field trip to Texas and the adjoining states for early spring collection of amphibians and reptiles. Despite the adverse season, interesting collections were made in Baylor County, Knox County, and Palo Pinto County in Texas, and in Natchitoches Parish, Louisiana.

The group also attended the meeting of the Texas Herpetological Society. This society has an annual field meet for a day's collecting that draws attendance of 40 to 50 members from various parts of Texas. Mr. Arthur F. Senior of Homewood, Illinois, an enthusiastic amateur photographer, joined the party to attend the meeting and obtained an interesting photographic record.

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PANGOLINS, TARSIERS, AND FLYING LEMURS OF PHILIPPINES

By KARL P. SCHMIDT
CHIEF CURATOR, DEPARTMENT OF ZOOLOGY

THE title of this preliminary note on the Museum's Philippine Expedition, which has been operating for more than a year in Luzon, Mindanao, and Palawan, might easily be extended to fill all of the space in a number of the BULLETIN with the mere catalogue of names of strange animals collected, among which only the words pigs, deer, and monkeys would have a familiar sound to non-zoological readers. Shrews, civets, and rare rodents; hornbills, parrots, and monkey-eating eagles; arboreal earthworms, colorful land snails, and giant centipedes; mosquitoes, bird-lice, and ticks; and insects, insects, and more insects will be enumerated in the accessions and catalogues and scientific reports dealing with the incoming collections.

THE TARSIER, REMOTE RELATIVE OF MAN

This strange-looking lemuroid primate is well represented in the collections of the Philippines Expedition, and the specimens will be used at the Museum in important research projects.

The Museum's Philippine Zoological Expedition of 1946–47 results from the pre-war interests of several American GIs, two of whom had been involved in the mosquito-control work of the Sanitary Corps and the Medical Corps in the Far East. At the end of the war, Captain Harry Hoogstraal, finding himself in the Philippines with Captain Anthony de Vos, of the Royal Netherlands Air Force and formerly of the staff of the great Buitenzorg Museum in Java, planned first of all to spend a year on the great spider-shaped East Indian island Celebes. When political disturbances and the necessity of repatriating Japanese prisoners made it impossible to work anywhere in the Netherlands Indies, Captain de Vos resigned from the project and came to America to continue his education.

Lieutenant Donald Heyneman then joined with Captain Hoogstraal in the alternative plan to collect mammals and birds, reptiles and amphibians, fresh-water fishes, and insects and land invertebrates of all kinds in the Philippines. It was their especial desire to profit by the existence of surplus Army equipment and of Army facilities. By co-operation with the personnel of the bomb-and-fire-destroyed Philippine Bureau of Science, it was hoped that their operations might be greatly extended and that preliminary steps might also be taken to build up collections for a new Philippine National Museum.

This plan had much obvious intrinsic merit as a project for Chicago Natural History Museum, which had conducted extensive anthropological collecting and study in the Philippines but had never acquired a representation of the Philippine animal life. Captain Hoogstraal had long been favorably known to the Museum for his promotion of zoological and botanical collecting in Mexico. A year's expeditionary work was accordingly approved by this institution.

The party began work in the high mountains of northern Luzon, famous in museum circles as a zoological "type locality" from the remarkable variety of curious or primitive rodents discovered there by the British collector John Whitehead. Most of these rodents are externally rat-like, but with extraordinarily modified dentition. Some are large and very un-rat-like, although still related to the true rats. Whitehead had collected on Mt. Data, which rises to an elevation of more than 10,000 feet, and the Hoogstraal party set up its camps on the same mountain. The Mt. Data collections, by a not unfamiliar mischance, arrived at the Museum only in June of the following year, more than a year after they were collected.

Desiring to strengthen Captain Hoogstraal's party for insect and invertebrate collecting, in line with the general desire to strengthen the Division of Insects in the Museum, Mr. Floyd G. Werner, of Ottawa, Illinois (quite recently from Okinawa), was attached to the party. Mr. Werner joined forces with Hoogstraal and Heyneman in southern Mindanao, planning to make a frontal zoological attack on two of the high mountains northeast of Davao, Mt. Apo

MOUNTAINS OF THE PHILIPPINES

Scene in the region combed by the Museum expedition. Mt. Apo and Mt. McKinley challenge the zoological collector.

and Mt. McKinley. The field collectors of the Philippine Bureau of Science greatly strengthened the small American personnel; it is to be hoped that this co-operation may prove an effective step in the rehabilitation of natural science in the new Philippine Republic.

Though a considerable by-product of exhibition material will accrue from the collections of the Philippine Expedition, the main emphasis in both plans and operations has been upon material intended for immediate research, collections to strengthen the reference collection in the Museum, and observation in the field. One scientific paper, based on these collections, "A New Species of *Tripteroides*," by F. E. Baisas of the Bureau of Health in Manila, describing a new species of mosquito, has already been published.

ISLANDS PRESERVE FAUNAS

The zoological interest of the Philippines lies in a combination of tropical wealth of life with insular and regional peculiarity. Islands may preserve primitive forms from extinction, as seems to be indicated by some of the strange rodents of Mt. Data in Luzon; island archipelagos may exhibit a profoundly interesting study of the origin of species in all stages and degrees in their insular species and chains of species; and, in the relations of the animal life from island to island, past land connections and directions of immigration of the land life of the region may be indicated. In a region so complex as the East Indies, analysis of the living plants and animals forms an important means of study of the basic geography.

To remark further only upon the mammals, the results of the expedition in this group alone suffice to make it a most notable one. The curious rodent genera of Mt. Data exhibit extraordinary modifications of skull and dentition that pose new and still unsolved problems of functional anatomy. The tree shrews of the southern islands have only recently been transferred from the shrews to the lowest place in the order Primates, to which man belongs. This gives extraordinary anatomical and evolutionary interests to this group. These interests may be extended directly to the ground shrew *Podogymnura*, which has long been known only from a single specimen; it was collected in considerable numbers by the Hoogstraal party, and several specimens were adequately preserved for anatomical study. This animal is an almost ideal living generalized mammal, essentially a "living fossil." Its anatomy will yield insights into the evolution of the mammals that are otherwise unobtainable.

RELATIVE OF MAN

Also because of its remote relations to man, the tarsier, a strange-looking and otherwise remarkable lemuroid primate, has had much attention from anatomists. This arboreal creature, with toes modified like those of a tree-frog or gecko for clinging to branches, has been difficult to obtain because of its small size and nocturnal habits. It seems at first astonishing and even horrifying that the Philippines party should have collected no less than eighty specimens of so rare an animal. But sudden abundance of a supposedly rare creature is by no means an unfamiliar experience to a museum collector, for rarity is more often apparent than real.

The tarsiers were obtained when their jungle habitat was cleared away for a Manila hemp plantation. Since the surrounding forest was undoubtedly already filled to its full carrying capacity with tarsiers, it is doubtful if many could have survived even if transported to the neighboring uncut forest. Vastly greater destruction of tarsiers obviously has taken place and continues inevitable wherever original forest is being cleared for agricultural use.

The scientific interest of the tarsier as to anatomy and behavior is very great, and it appears that the Museum's series will be

JUNGLE CLEARING ON PHILIPPINES EXPEDITION

Numerous tarsiers and other animals desired for the Museum collections were disclosed by these operations. Inset: The tarsier. Its zoological interest is in inverse proportion to its size; it can be held in the palm of a man's hand.

THE PANGOLIN

Otherwise known as a scaly anteater, this creature represents a Bornean element in the Philippine fauna.

put to excellent scientific use. Research Associate A. A. Dahlberg has undertaken a report on the individual variation of the dentition and its succession. Among recent visitors to the Museum's Division of Anatomy, Dr. H. W. Mossman of the University of Wisconsin and Dr. C. O. Bechtol have signified their interest in undertaking special studies on our tarsiers. The disporportionately large eye, which appears to be fixed in a forward direction, together with a great movability of the head, which appears to rotate through 180° on the neck, suggests both anatomical and behavioral problems. It is to be hoped that Major George Wharton, engaged in collecting for the United States National Zoological Garden, may be

TREE SHREW

These inhabitants of the East Indian region are the most primitive of the Primate relatives of man.

successful in bringing back tarsiers alive. Major Wharton will deliver the expedition's live monkey-eating eagle (one of the great rarities among Philippine birds) to the Brookfield Zoo.

FLYING LEMURS

Still another of the remarkable mammals of Mindanao is the so-called "flying lemur," an insectivorous mammal that is so highly modified that its relations to the insectivores proper and to the lemurs are obscure. This creature exhibits the extreme of development of gliding flight among mammals; it is provided with membranes between the fore and hind limbs, like those of a flying squirrel, but these extend also between tail and hind limbs and the chin and forelimbs. The Museum had two specimens of the flying lemur, neither in good condition; the Philippine collection contains thirty specimens.

Of less immediate scientific importance, but of the most spectacular public and general interest, is the pangolin, or scaly anteater, shown hanging by its tail from the hand of a Philippine collector in one of the accompanying illustrations. The large overlapping scales of this strange mammalian type give it a superficial resemblance to a reptile, and specimens have sometimes been delivered to the reptile departments of museums as a result. The pangolin, like other termite-eating types, has lost its teeth in the course of evolution. Like the flying lemur, the pangolins represent a distinct and most peculiar order of mammals.

SUMMER GUIDE-LECTURE TOURS, MORNINGS AND AFTERNOONS

During July, conducted tours of the exhibits, under the guidance of staff lecturers, will be given on a special schedule, as follows:

Mondays: 11 A.M., The Earth's Green Mantle (General survey of the plant exhibits); 2 P.M., General Tour (Exhibition halls, all Departments).

Tuesdays: 11 A.M., The People of the World (General survey of the anthropology exhibits); 2 P.M., General Tour.

Wednesdays: 11 A.M., The Earth's Story (General survey of the geology exhibits); 2 P.M., General Tour.

Thursdays: 11 A.M. and 2 P.M., General Tours.

Fridays: 11 A.M., The World of Animals (General survey of the animal exhibits); 2 P.M., General Tour.

There are no tours given on Saturdays, Sundays, or on July Fourth.

Wyoming Fossil-Field Trip

A field trip to the Washakie Basin in southern Wyoming was concluded by Dr. Rainer Zangerl, Curator of Fossil Reptiles, on June 5. The Washakie formation is of late Eocene age and its fauna is relatively poorly known. Among the more important results of Dr. Zangerl's exploration are the discovery of a turtle-crocodile-fish graveyard covering a large area, a well-preserved shell of a large land turtle, and a fine skull of a soft-shell turtle.

SIX SUMMER MOVIE PROGRAMS OFFERED FOR CHILDREN

The annual summer series of free motion picture programs for children on Thursday mornings during July and August will open July 10. The series is presented under the auspices of the James Nelson and Anna Louise Raymond Foundation. Six programs will be given featuring films on natural history and travel; animated cartoons will be included on four.

The entertainments will be given in the James Simpson Theatre of the Museum at 10:30 A.M. Children are invited to come alone, accompanied by parents or other adults, or in groups from clubs and various centers. Admission is free. Following are the dates and titles of the films:

July 10—THUNDERHEAD
A story sequel to "My Friend Flicka."

July 17—REALM OF THE WILD
Wild game and birds of our National Parks.
Also a cartoon.

July 24—SUMMER ADVENTURES FOR ALL
Ideas for a vacation near home.
Also a cartoon.

July 31—PUSS IN BOOTS
Also a cartoon.

August 7—ADVENTURES OF CHICO
The story of a Mexican Indian boy.

August 14—ANIMAL TALES
Also a cartoon.

Central America Botanical Expedition Reports Recent Progress

Recent reports from Mr. Paul C. Standley, Curator of the Herbarium, indicate that the expedition that he is leading is making substantial progress. Most of the time since Mr. Standley left last November has been spent in El Salvador and Honduras. Many different localities were visited in these countries and many species hitherto unknown from these areas were found, e.g., a number of species previously known only from Guatemala have thus been added to the flora of Honduras. During the early part of May, the expedition moved to Nicaragua, the least known of the Central American countries. Here many important discoveries are expected during the course of exploration in the next few months.

Paleontology Expedition to Colorado

An expedition to collect specimens of prehistoric mammals in the vicinity of Mesa, Colorado, left the Museum June 9. Mr. Bryan Patterson, Curator of Paleontology, is leader. He is accompanied by Mr. James H. Quinn, Chief Preparator in Paleontology, and Mr. William Turnbull, Preparator.

THE ADVERSITIES OF ANGELINA (A FOSSIL, NOT A MOVIE)

By EUGENE S. RICHARDSON, Jr.
CURATOR OF INVERTEBRATE FOSSILS

PAULINE had her Perils; Belinda the Beautiful Boiler Maker's Daughter had more than her share of woes. Happy are those who can retire to a quiet case in a museum. One of the retired characters staying here with us is *Angelina*. Her present address is Hall 37 (Frederick J. V. Skiff Hall), where she is propped up in the upper right-hand part of the case devoted to Cambrian fossils.

Our *Angelina*, and thousands of her kindred with such thoroughly un-British names as *Shumardia*, *Asaphellus*, *Olenus*, *Triarthrus*, and *Euloma*, were trilobites, living quietly with a multitude of smaller and less active neighbors in the quiet sea that covered a large part of England in the late Cambrian period. However confident we may be that "there'll always be an England," we may be still more certain that there has not always been an England—at least not the same rabbit-shaped island that we sometimes call Albion.

Fig. 1

A long time ago, before the North Sea and the English Channel flooded the edge of Europe, England was a part of the continent, and the Thames a minor tributary of the Rhine. And long before the Thames started flowing, Britain was a region of arid basins of high, block-like mountains shining bright red under a semitropical sun. Before that, it was a low, swampy place with mountain ranges where are now Wales and Scotland.

ONCE DOMINANT CREATURES

But even this was long after *Angelina's* time. She and her relatives with the queer names found their warm sea-bottom a good place to live and feared nothing in it, for they were the biggest and strongest of all its creatures.

Angelina may have lived four or five years, slowly crawling about on the muddy sea-floor and chewing up the smaller animals that had died and fallen to her table. Then, having attained a length of about two inches, she too died in the fullness of age, settled down into the mud, and wasn't seen again for 600 million years. Her life had been uneventful, but her troubles had not yet begun when the slowly settling silt of the Cambrian sea closed over her paper-thin shell (Fig. 1).

A trilobite is a very much-jointed animal, even more so than the related horse-shoe crab of the present time, and *Angelina* had sixteen different pieces to her shell, hinged together to help her move about: a head-shield, a segmented body-shield, and a small tail-shield. Her under side had no shelly covering, and even the legs, of which a pair stuck out from under the ends of each shell segment, were soft and weak, each with a feathery gill for obtaining oxygen from the water.

MERGED INTO SHALE

When *Angelina* died, her soft parts quickly decayed, and she was left with nothing but the test (shell) that covered her back. Soon the slowly accumulating clay and silt of the sea-floor buried her deeply, and in course of time, when the overlying material had consolidated and become shale, *Angelina* became part of the shale.

At the end of the Cambrian period (550 million years ago), *Angelina* lay well buried, so well buried indeed that the first gentle upheaval of the earth's crust, anticipating a period of mountain building, had no effect upon her. With the beginning of the next period, the Ordovician (480 million years ago), some of the newly formed Cambrian rocks were arched above sea level in the region of the present English-Welsh border, east of *Angelina's* former home. It was a naked land, and the streams that carried off the rain water fallen upon it carried off the land as well, depositing it again to the westward. Thus *Angelina* was buried ever more deeply.

Fig. 2

High above *Angelina's* grave now was a moderately deep sea of quiet, warm water, with animals different from those she had known. Conditions of life were a little harder; the trilobites no longer ruled the sea. There appeared animals larger than her kind—cone-shaped cephalopods with arms like the modern octopus and appetites like the modern schoolboy. But even more disturbing was the continued evidence of crustal unrest. Volcanoes broke out, both on the land as far east as what is now London and in the sea itself, where they formed chains of islands much like the Hawaiian chain. The ash and dust from the volcanoes fell as sediment on the bottom of the sea. Lava pouring from the volcanoes flowed out under the water in wrinkly, stubbly sheets, while the water boiled and bubbled and the local trilobites were stewed alive. *Angelina*, however, was safely underneath all this commotion, and even the lava rising to the volcanoes through cracks in the earth's crust by some fortunate chance happened to miss her delicate shell.

ADVERSITIES BEGIN

But at the close of the Ordovician period, *Angelina's* luck ran out. The shale in which she lay imprisoned, along with the other rocks since deposited above her, was folded into gentle waves and lifted above sea level. With the folding and accompanying pressure, the shale became harder, more like slate. It is here that the real adversities of *Angelina* began, for the folding of the rocks pushed her shell a little out of shape and she didn't look herself at all (Figs. 2 and 3).

For a while there was peace and quiet. The low hills were eroded by the run-off of rain water until the land was flat and near sea level. During the next period, the Silurian (390 million years ago), this new lowland slowly sank beneath the waters and again there was a sea, with *Angelina* down there somewhere far underneath its bottom, but no longer lying flat, as before, for the late Ordovician folding had tilted the bed of rock in which she lay. Several times during the Silurian there were episodes when the rocks were again squeezed into tighter folds and she was further distorted. The pulses of activity were becoming more and more frequent.

COMES THE REVOLUTION (GEOLOGICAL)

Finally, at the close of the Silurian period, the greatest and longest-continued epoch of compression occurred, and the rocks were not only tightly folded but were broken and pushed along. It was the birth of a major range of mountains, the Caledonian range, rivaling the Rocky Mountains in size though not in beauty, for they were without trees—without plants, indeed, except for lichens and possibly some very tiny woody reeds.

The Caledonian Revolution ended hundreds of millions of years ago, and the mountains then formed have long since been worn down to plains and valleys, covered again with further deposits and now again uplifted and eroded. During this erosional cycle, in the cutting of one of the present valleys, the bed containing *Angelina* was finally exposed. Ages passed;

Fig. 3

KEY TO FIGURES

Fig. 1—Angelina sedgwicki as she appeared in life. One-half natural size.

Fig. 2—Angelina as she appears in exhibit of Cambrian fossils in Frederick J. V. Skiff Hall (Hall 37). Natural size.

Fig. 3—Another Angelina sedgwicki, which happened to lie in a different relation to the Caledonian pressure. One-half natural size.

glaciers and glacier-dammed lakes occupied the valleys. Stone Age man hunted now-extinct animals; Druids performed strange rites in their leafy temples; Welsh tribesmen hurried past in their successful defense of Wales against the legions of Caesar, Hadrian, the Danes, the Normans; plows and cultivated fields appeared; and, finally, a paleontologist with his hammer and chisel.

While breaking up piece after piece of the Tremadocian shale, the scientist discovered *Angelina*, very nearly ruined by the vagaries of Nature. *Angelina*, we blush to relate, has even lost her shell; for, as the valley was cut closer to her bed, the slowly moving water always present just below the ground had dissolved it. What we see of her now in Skiff Hall is only a distorted cast of the shell's lower side. Almost destroyed, she is still recognizable as a member of the species to which J. W. Salter, in November of 1864, gave the name *Angelina sedgwicki*.

Soon after her discovery, *Angelina* was set on her travels, her first since the Caledonian Revolution had moved her original burial place. Eventually she arrived in Rochester, New York, at Ward's Natural Science Establishment, and in 1891 came to Chicago as a member of the first collection of fossils in what was then the Columbian Museum. Since that time *Angelina* has been blandly ignoring the stares of countless visitors. She will ignore you too, if you go to see her.

A UNIQUE AMERICAN PALM, VEGETABLE IVORY

By JULIAN A. STEYERMARK
ASSISTANT CURATOR OF THE HERBARIUM

Normally ivory, the hard dentine-containing substance found in the teeth of most mammals, is secured from the large teeth of elephants, walruses, hippopotamuses, and narwhals. Although it has no structural counterpart as such in the vegetable world, the fruit of some tropical American palms contains a remarkably hard, creamy-white substance resembling the consistency and appearance of true ivory to such a degree that it is called "vegetable ivory." The generic name of these palms is *Phytelephas*, meaning "plant elephant," because of the obvious resemblance between the ivory of the elephant and that of the plant. The Spanish name, often applied to fruit of this palm, is "marfil vegetal," which means "vegetable ivory."

About a dozen species of vegetable ivory palm are known. Although most of them occur in South America in Venezuela, Colombia, Ecuador, Peru, and Brazil, some extend as far north as Panama. They are usually vigorous palms having a short stout erect trunk topped in plume-like fashion by long dark green feathery fronds. These leaves may attain a length of twenty feet, each leaf segment measuring up to three feet in length and two inches in width. A single leaf may have 160 segments.

The leaves are used as thatch in much the same way as those of other palms, but are considered inferior because of their limited durability. In very young plants the leaves appear to arise directly from the ground, whereas the trunk becomes thicker and more elongated as the plant grows older. Even in mature plants the height of the stem does not exceed ten or fifteen feet. The plants grow in tropical or subtropical rain forests from near sea level up to an altitude of 3,500 feet, usually inhabiting damp areas, such as valleys, banks of streams, and moist slopes near rivers. Probably the species best known is *P. macrocarpa* of Ecuador, Peru, and Brazil. During my explorations of the quinine forests in southern Ecuador this palm was often seen at elevations of 3,000 to 3,500 feet, occurring nearly at the lowermost limit of growth of the quinine forests.

VEGETABLE IVORY AND PRODUCTS

Various toys and ornaments carved from the seeds of the vegetable ivory palm. In the center two of the seeds are shown with their wrinkled exterior. Inset: The fruit of the palm. It consists of a compact head of single fruits, each containing from four to six seeds, some of which are shown sectioned.

In Ecuador the plant itself is called "cadi," and the seed, which contains the hard white ivory-like substance, is known to the inhabitants as "tagua" or tagua-nut. The trees are often cut down by local people for the tender whitish heartmeat found within the growing tip below the leafy crown. This may be eaten as a salad, which is quite delicious when mixed with some kind of dressing, or plain with only salt added to flavor it, or cooked like any other vegetable. It has the rich meaty quality peculiar to most palms. As is well known, many other palms are commonly used for food. It is a wasteful practice to destroy such large plants for the sake of relatively small amounts of food, though such delicacies constitute for the people a real change in the otherwise monotonous daily diet limited to rice, beans, potatoes, and tortillas (corn cakes).

Actually it is a time-consuming as well as laborious task to cut down one of these palms for the heartmeat alone, because the trunk is very hard and tough. A man may spend half an hour or more whacking away at one of these trunks with his machete before felling the plant. In Ecuador, for example, the halves of the trunk are severed with the machete, and the leaves are then laboriously cut near the base of each thickened leaf-stalk or petiole. As these overlap with one another and surround the central core of the stem in a spiral manner, each leaf-stalk must be chopped off separately from the main trunk. Finally, the growing point is encountered on the inside and the delicious white interior can be taken out. It consists of the bases of the unexpanded leaves and petioles.

Aside from the use of this plant for food, its most interesting and profitable part is the hard ivory-like portion of the seed. In the vegetable ivory palm, the sexes, contained in the flowers, are found on separate plants, some of the plants bearing only male flowers, others female flowers. The fruits, found only on the female palms, consist of clusters of six or seven large drupes, the whole mass becoming the size of a man's head. At first these clusters are erect, but later, owing to the increasing weight of the ripening fruits, become pendulous.

When ripe, these clusters may weigh about 25 pounds. The outside of the fruits is marked by dark brown woody wrinkles or convolutions. The inside consists of a hard white portion containing the seed. At first, the inside of the young fruit consists of a clear tasteless liquid, often drunk by the inhabitants as a thirst-quencher. Gradually, the liquid assumes a milky color and solidifies into a hard ivory-like substance. This solid portion, vegetable ivory, has great commercial importance. The inhabitants of Ecuador carve from it all kinds of ornaments, toys, ash trays, rings, reels of spindles, knobs of walking sticks, etc.

USED FOR BUTTONS

But far more important than these are the hundreds of thousands of tons of buttons that are made from this material. Large quantities are exported to Europe and North America, as well as to various South American countries. As early as 1840, quantities of 150 tons were imported into England. The buttons are very durable and, until a short time ago, were as commonly used, if not more commonly, than ordinary pearl buttons. Now, with the introduction of plastics, the button industry that uses vegetable ivory is meeting greater competition. In Ecuador alone, the exportation of tagua nuts occupied fifth place in that nation's exports, nearly 65,000,000 pounds being shipped annually. Most of the shops manufacturing buttons are in the towns of Manta, Guayaquil, and Ambato.

Ecuador is believed to possess the highest grade of vegetable ivory found anywhere. Thus far, attempts to establish plantations of this palm in other countries have been unsuccessful. An exhibit showing the natural fruit and various articles carved from vegetable ivory may be seen in Case 7 of Hall 25 (Food Plants and Palms).

Chicago Natural History Museum

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* Deceased June 20, 1947

Members are requested to Inform the Museum promptly of changes of address.

WILFRED HUDSON OSGOOD
1875–1947

News of the death of Dr. Wilfred Hudson Osgood on June 20, after a brief illness, was received at the Museum with deep regret. He was 71 years old.

WILFRED H. OSGOOD

Dr. Osgood joined the Staff of the Museum in 1909 as Assistant Curator of Mammalogy and Ornithology, after serving twelve years with the United States Biological Survey. In 1921 he became head of the Department of Zoology at the Museum and continued in that capacity until 1940, when he retired as Chief Curator. As Curator Emeritus at the Museum, he continued, until the date of his death, the scientific research for which he was pre-eminently qualified.

Dr. Osgood was a graduate of Stanford University, where he formed life-long friendships among naturalists of his generation. Joining the United States Bureau of Biological Survey in 1897 (while still an undergraduate), when that organization was undergoing rapid expansion, he came under the influence of C. Hart Merriam and as a result became one of the American group pre-eminent in the study of mammals. His field work for the Biological Survey was especially in Alaska and western North America.

After joining the Museum staff, Dr. Osgood took part in one more major governmental activity, the important investigations of the fur seal in Bering Sea, resulting in the report of the Fur Seal Commission of 1915. In Chicago Natural History Museum, he soon developed a program of South American studies that took him repeatedly to that continent. His special interest in the geography of South American mammals was varied by the leadership of the *Chicago Daily News*–Field Museum Expedition to Abyssinia in 1926–27, and a personal expedition to Indo-China in 1937.

The scientific interests of Dr. Osgood are reflected in his bibliography of more than 200 titles. His publications range from the monumental study of the white-footed mice, published in 1909, to discussion of details of the scientific nomenclature of mammals, in the *Journal of Mammalogy*. His major publications for the Museum include his monograph on the remarkable South American marsupial *Caenolestes*, a volume on the mammals of Indo-China, and one on the mammals of Chile (1943). A volume of papers on mammals written by his friends and colleagues was published in 1942 as a testimonial to his leadership in this field. A distinguished volume, *Artist and Naturalist in Ethiopia*, was written by Dr. Osgood in collaboration with his friend, the eminent animal artist Louis Agassiz Fuertes, who had joined the Abyssinian Expedition.

Numerous affiliations with scientific societies, especially as charter member of the American Society of Mammalogists, as Fellow of the American Ornithologists' Union, as Corresponding Member of the Zoological Society of London, etc., indicate the breadth of Dr. Osgood's scientific affiliations. His services in Chicago to the Geographic Society of Chicago and to the Chicago Zoological Society, in both of which he served on the Board of Directors, are examples of his service to the community in which he made his home. He served similarly in the Quadrangle Club, where he lived, and the University Club of Chicago.

The studies of the small rodents known as white-footed mice, ubiquitous on the North American continent, foreshadowed a continuing interest in the rodent group, which includes many more species than all of the remaining types of mammals together. It is important to note that Dr. Osgood's disentanglement of nomenclature and classification in a large and complicated group of small mammals remains significant and useful after 40 years. Still more important is the fact that his work on the white-footed mice laid the foundations for investigations in the modern fields of genetics and ecology. They thus form an illustration of the profoundly important ramifications of investigations in pure science.

Members of the Museum staff and other friends of Dr. Osgood attended a memorial service on June 25 at Bond Chapel on the University of Chicago campus.

STAFF NOTES

Colonel Clifford C. Gregg, Director, was a speaker before the science section of the annual meeting of the American Association of Museums held in the city of Quebec, Canada, May 30. His subject was "Live Ideas or Dead Storage."

* * *

Dr. Rainer Zangerl, Curator of Fossil Reptiles, was recently appointed Lecturer in Geology in the Department of Geology at the University of Chicago. He has also contributed to the *Encyclopaedia Britannica Book of the Year*, writing the article on "Paleontology" for the 1947 edition.

* * *

Mr. Emmet R. Blake, Associate Curator of Birds, was recently elected a Director of the Illinois Audubon Society and Vice-President of the Chicago Ornithological Society.

Colombian Botanist on Staff

Dr. José Cuatrecasas of Cali, Colombia, has been appointed to the Museum staff as Curator of Colombian Botany for a period of three years, during which he will engage in research on the flora of Colombia, using the collections of this institution and the extensive herbarium that he has collected.

Three New Contributors

Three names have been added to the Museum's roll of Contributors by action of the Board of Trustees. (Contributors are a special class of membership including all persons whose gifts of money or material range from $1,000 to $100,000.)

Dr. M. Acosta Solis, Director of the Instituto Ecuatoriano de Ciencias Naturales, Quito, Ecuador, was elected in recognition of his gift of extensive and valuable plant collections to the Museum Herbarium.

In recognition of notable gifts of geological and zoological specimens and microscope slides, Dr. Rainer Zangerl, Curator of Fossil Reptiles, was elected.

The late Mr. Oscar E. Remmer was posthumously elected a Contributor because of a generous legacy to the Museum.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

Hermon Carey Bumpus, Yankee Naturalist. By Hermon C. Bumpus, Jr. University of Minnesota Press, Minneapolis, 1947. 141 pages, 14 illustrations, price $2.50.

To modern museum curators some of the things in both university education and museum exhibition that had to be fought for by Hermon C. Bumpus have become commonplace. This biography by his son pleasantly records his career from birth and childhood to old age with honors. One might wish for a more literary, more colorful, and more critical account of Bumpus' career as teacher of biology in the best Agassizian tradition, as assistant director at the Marine Biological Laboratory at Woods Hole, as director of the great American Museum of Natural History in New York City, as university business manager, as university president, and as a leader in the movement for outdoor education in the National Park Service.

K.P.S.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: George F. Niklaus, Boise, Ida.—a Chinese dollar, China; Mrs. Paul Q. Card, Minneapolis—a Hupa basket and a Hohokam bowl, jar, and 25 projectile points, Arizona.

Department of Botany:

From: University of Texas, Austin—269 herbarium specimens, Missouri and Mexico; Dr. M. S. Doty, Evanston, Ill.—69 specimens of algae, Massachusetts; University of California, Berkeley, Calif.—844 specimens of algae, North America, Oceania, Malaysia, China, and Africa; Dr. Walter Kiener, Lincoln, Neb.—260 specimens of algae, Nebraska; Donald Richards, Chicago—50 specimens of mosses, chiefly Maryland; William R. Overton and Wesley Gillespie, Arlington Heights, Ill., and J. Francis Macbride, Palo Alto, Calif.—513 cryptogams, Arizona and New Mexico; Prof. Cesar Vargas C., Cuzco, Peru—97 herbarium specimens, Peru.

Department of Geology:

From: Charles Towey, Westmont, Ill.—an invertebrate fossil and 4 minerals, South Dakota and Illinois; Mrs. B. H. Heide, Chicago—fossil skull and jaws, and 2 polished agates; Miss Priscilla Freudenheim, Chicago—a specimen of chrome ore, Philippine Islands; William E. Menzel, Chicago—a dakeite and a fluorite specimen, fluorescent, Wyoming and Illinois; George Langford, Chicago—2 invertebrate fossils, Illinois.

Department of Zoology:

From: Lincoln Park Zoo, Chicago—a fiddler crab, a European hedgehog, 2 hellbenders, and an American badger; Alex K. Wyatt, Chicago—a spider and 151 insects, Colorado, Florida, Illinois, and Indiana; Rupert L. Wenzel, Oak Park, Ill.—28 histerid beetles; Dr. Georg Haas, Jerusalem, Palestine—50 land and freshwater shells, United States; R. M. Barnes (now deceased) —280 clutches of eggs; Don McVicker, Chicago—a European hedgehog; Robert L. Haas, Chicago—288 specimens of stream fishes, Illinois; Dr. Henry Field, Cuernavaca, Mexico—8 specimens of shells, Mexico; Chicago Zoological Society, Brookfield, Ill. —a Diana monkey; Maj. Robert Traub, Washington, D. C.—2 fleas (on slides), a holotype and an allotype of *Opisodasys hollandi* traub, Mexico; Prof. Clarence R. Smith, Aurora, Ill.—a red fox, Illinois.

Library:

From: Stanton Brumfield, Santa Fe, New Mexico; Martin Gusinde, Luxenburg bei Wien, Austria; Dr. Henry Field, Cuernavaca, Mexico; Col. Clifford C. Gregg, Valparaiso, Ind.; Propeller Club of the United States, New York City; and University of Chicago and Polish American Congress, Inc., both of Chicago.

NEW GENERAL GUIDE FEATURES PICTURES

A new and different General Guide to the collections of the Museum, prepared in a form much easier than the old one to use and profusely illustrated, was published by the Museum last month. In addition to its functional use as a guidebook, it is highly attractive as a souvenir. It is priced at 15 cents.

The guide has attractive covers symbolic of the scope of the Museum; a map of Chicago showing the Museum's location relative to other Chicago landmarks and the various means of transportation for reaching it; floor plans of the exhibition halls, made easy to follow by pen-and-ink sketches suggestive of their contents; 31 half-tone illustrations of the building and of outstanding exhibits; general information about the Museum, its facilities, activities, organization, and history; and summaries, much more brief and clear than in the old guide, of the contents of each exhibition hall. For visitors with a limited amount of time, the guide provides directions for a brief survey tour, carefully arranged to cover the highlights of all departments within about one hour, and illustrated charts of the course to be followed as well as textual directions.

Unfamiliar scientific names often have a simple meaning. An example is the amygdule. This is merely the mineral filling of a bubble in lava made by escaping steam as the lava cooled.

JOINS STAFF AS CURATOR OF ECONOMIC BOTANY

Dr. Hugh Cutler, recently appointed Curator of Economic Botany, began his duties in June. A graduate of the University of Wisconsin and Washington University, St. Louis, he conducted research in Mexico and Guatemala through the facilities of the Missouri Botanical Garden. While a Fellow of the Guggenheim Foundation and a staff member of Harvard's Botanical Museum, he conducted botanical expeditions in Brazil, Bolivia, and Paraguay to collect wild corn and some of the grasses related to corn. During the war he was a field technician for the United States government's Rubber Development Corporation, and in that capacity was engaged in work in Brazil.

HUGH CUTLER

French Librarian a Visitor

Dr. Julien Cain, Director-General of the Bibliothèque Nationale in Paris, was a recent visitor to the Museum. He is also Vice-President of the International Council of Museums.

NEW MEMBERS

The following persons became Members of the Museum during the period from May 15 to June 14:

Contributors

Oscar E. Remmer,* Dr. M. Acosta Solis, Dr. Rainer Zangerl.

Associate Members

Robyn Wilcox

Sustaining Members

Rowland L. Williams

Annual Members

Mrs. Hugo F. Arnold, Dr. A. Allan Bates, Joseph T. Bay, Richard C. Bond, Kenneth H. Brush, Charles H. Campbell, Nathan Cummings, L. Hyland Erickson, John N. Gage, Gerald Gidwitz, F. A. Groenwald, Richard H. Grosse, George E. Gunther, Mrs. Caroline M. Haas, Edward B. Heyden, Henry Mark Hilton, Mrs. Jaroslava B. Kosner, Howard Lane, B. F. Lewis, Edward E. Loebe, Charles A. Marshall, Lee R. Maxwell, H. J. McAllister, Gordon M. Metcalf, Fred C. Morgan, Harley W. Mullins, W. A. Patterson, Elliott H. Pennebaker, Sanger P. Robinson, Mrs. Donald M. Roche, John H. Rodger, Thomas W. Rogers, Harry H. Saalfeld, Harold C. Schott, J. N. Stanbery, Anton J. Tadrowski, George P. Torrence, W. Fred Townley, G. H. Turner, Mrs. Benjamin Weil, Mrs. Frank E. Wilhelm, William P. Wiseman, Arthur H. Woodward, Austin M. Zimmerman.

* Deceased

APPEASING THE 'SPIRITS' OF DESTINY IN THE PHILIPPINES

The Tinguian tribes of northwestern Luzon in the Philippines are a people whose entire life is organized under the control of "spirits." They believe in specific spirits, each assigned to exerting an influence upon almost every act or occurrence in the day's work or play. To the Tinguians, religion is thus a very real and all-important concept. They believe even in special spirits that "cause pains in the side" (appendicitis?),

IT LOOKS ROUGH—

—but they're not fighting. This is the ceremonial of the pounding of the rice. (Museum expedition photo.)

others that cause headaches; spirits that guard over children, and spirits that exert a malign influence upon them; spirits that affect crops, the issues of war, the safety of dwelling places. The favor of the good spirits must be sought with offerings and ceremonies, while similarly the evil spirits must be appeased. In these dealings with the unseen and supernatural creatures in control of the destiny of every man, woman, child, or group of people, important functions are performed by properly qualified mediums and various kinds of charms.

A SPIRIT "DICTATOR"

In the Museum's Hall of the Philippines (Hall H) is an interesting and extensive exhibit (Case No. 2) illustrating the lengths to which these people go to assure themselves of peace with the world of the spirits. That world, incidentally, is represented as a thorough-going dictatorship—it is dominated by a great and powerful spirit called "Kadaklan" who lives in the sky. To him all other spirits are subordinate, "like soldiers," the people say. Kadaklan, remaining aloof in his celestial home, is assisted by a sort of deputy named Kaboniyan, who resides on the earth and is regarded as the friend and helper of the people. Kaboniyan is credited with having taught the Tinguians how to plant and harvest, how to overcome evil signs, and how to foil the designs of ill-disposed spirits. He is believed to inhabit a magical mountain cave in which is a wonderful tree on which grow the agate beads so prized by the women. "Living" also in this cave are "jars which talk and move," and from its depths are believed to come all the gongs which the people use and upon which they place great value. The friendly Kaboniyan is supposed to have taught the Tinguians nearly all the details of ceremonies and celebrations. Further to bind himself to the people he is reputed to have married "in the first times" a mortal woman from Manabo. More than 150 other spirits, some good, some evil, are known by name and at one time or another are believed to visit the people through their mediums.

WOMEN SERVE AS MEDIUMS

The mediums are especially qualified women, and examples of the outfits with which they must be provided are included in the Museum exhibit. Before a candidate may become a medium she must have mastered the details of all the ceremonies, numbering more than twenty. When this has been satisfactorily accomplished, she secures her outfit, consisting of a basket, one hundred fathoms of thread, and certain seashells. A small pig is then killed. The blood is mixed with rice and offered to the spirits, who are summoned by striking the shells against a fish or plate. The liver of the animal is carefully studied, and if any spots or blemishes appear on it, the spirits are regarded as unfriendly to the candidate, and the medium may not perform her duties until such time as a favorable sign may be obtained.

Special offering holders, made of bamboo, are often seen near the entrance to a town. In these are placed jars of food and drink to appease "the spirits that cause headaches"—in early days the same baskets were used also to display the heads of slain enemies.

PORK FOR THE SPIRITS

Filipino medium offering pigs to the supernatural beings who are believed to control all human destinies. (Museum expedition photo.)

These baskets and many other objects may be seen in the Museum exhibit. There is a spirit mat with its ten clay dishes used to set out a meal for the spirits. When the food is ready to serve, the medium strikes two split sticks on the ground, and the rattling sound produced is supposed to attract the attention of the spirits, who are then invited to partake of the repast. Shown also are spirit boxes representing the head and horns of a carabao, and pottery spirit houses, in both of which cups and dishes with food offerings are likewise placed. The pottery houses are regarded as dwelling places of the spirit who multiplies the rice.

HOLDING BACK A FLOOD

Another object shown is a weaving stick used during flood time—it is believed that the river can be held within its banks if this stick is planted at the water's edge by a woman, provided, however, that the woman was "born on the far side of the river." Each village is believed to be guarded by a spirit whose residence is a guardian stone which may be found in a grove near-by. Examples of these guardian stones are exhibited in the Philippine hall. These particular spirits are credited with the ability to change form at will to that of a wild chicken or a white dog.

Ceremonial garments, jewelry, and blankets, examples of strange charms, bells and ornaments used in ritual dances, and many other objects associated with the peculiar superstitions of the Tinguians are also included in the exhibit. Even special trousers are provided to be worn by female mediums when impersonating male spirits. It is the extreme attention to such details as this that makes the Tinguian beliefs especially interesting.

NEW CURATOR APPOINTED IN BIRD DIVISION

Dr. Austin L. Rand, formerly Acting Chief of the Division of Biology at the National Museum of Canada, Ottawa, will join the staff of Chicago Natural History Museum on July 7, as Curator of the Division of Birds.

AUSTIN L. RAND

Dr. Rand, a Nova Scotian by birth, comes to the Museum well qualified for this position. He was associated with the American Museum of Natural History in New York for about fourteen years, prior to his joining the staff of the National Museum of Canada, in 1942. He has had wide expeditionary experience in Madagascar and the southwest Pacific area, as well as in the United States and Canada.

The position of Curator of Birds at this Museum has been vacant since the resignation of Curator Rudyerd Boulton on July 1, 1946, to remain in a government post.

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HOW PREHISTORIC PUEBLO INDIANS OF SOUTHWEST LIVED

By JOHN RINALDO
ASSISTANT IN ARCHAEOLOGY

An exhibit recently installed in the Museum's Hall of American Archaeology (Hall B) presents in graphic form some highlights of Pueblo Indian life and customs from A.D. 500 to 1700, as revealed by archaeology. This exhibit illustrates some of the characteristics of the ancestors of the contemporary Pueblo Indians.

During the 1,200 years of history outlined in this exhibit, the Pueblo Indians lived on the deserts and mesas of northern Arizona and New Mexico and southern Utah and Colorado. Like their present-day descendants, they grew corn, squash, and beans and obtained food also by hunting. They kept dogs and turkeys. The turkeys were used not only for food; their feathers were woven with yucca fiber string into warm feather-cloth blankets.

UNDERGROUND IN AN 'AIR-CONDITIONED' KIVA ABOUT A.D. 1200
Miniature model by Dioramist Lee Rowell included in the new Pueblo Indian life exhibit in Hall B.

The Pueblo Indian towns of prehistoric times, like those of today, were in a form that could be described as terraced apartment houses. The houses were several stories high, with the upper stories terraced back from the lower ones. The apartments were frequently built around a central plaza or courtyard. Under the floor of the plaza were ceremonial rooms called "kivas," which served a purpose similar to that of our churches. These were used also as a center where men of a certain clan met, and for weaving and other handiwork.

EARLY 'AIR CONDITIONING'

"Kivas" are considered by archaeologists to have been a development from a slightly different form of earlier underground pit houses that were used as dwellings. Like them, the kivas contained in their structure a kind of air-conditioning system. Outside and through one wall of the circular kiva chamber (tradition decreed that it should be the south wall, if possible), there passed an L-shaped shaft with the opening of the vertical section on the outside at ground level and that of the horizontal section on the inside at floor level. A few feet away, in front of the floor-level opening, stood a deflector screen and, just beyond that, the fire pit. Directly above the fire pit was a hatchway entrance in the roof, through which a ladder projected. When a fire was burning, hot air and smoke arose and flowed out of the hatchway entrance, causing a mild vacuum. The fresh air thus drawn down through the L-shaped ventilating shaft came out at the floor-level opening as a draft and then hit the deflector screen where it was forced to circulate around either side of the fire pit and fire, being warmed thereby and in turn warming the room beyond. The smoke from the fire and the warmest air at the roof level passed up and out the hatchway.

The prehistoric Pueblo Indians made fine, tightly woven baskets of osiers, wooden splints, split roots, or yucca fibers, clothing of apocynum fiber, human hair, or cotton cloth, and ornaments of stone and shell. Their artistic ability and their interest in ceremonies are shown in their pottery, basketry, and textile designs as well as in the murals in their kivas. So intense was their desire for decoration that they even covered the soles of their sandals with complex patterns of knots. Their well-fired pottery, decorated with geometric designs painted in black on a grayish-white background, was made in many shapes, such as bowls, ladles, and mugs.

DEVELOPMENT OF AX

These prehistoric Indians used tools and weapons of stone, bone, and wood. Progressive style trends in a few of the tools and pottery types and also developments in sandal types and architecture are shown in half of this exhibit. For example, there is shown the development of the ax from a relatively crude implement, notched at either side of the head for the attachment of the handle, to a nicely worked ax with a three-quarter groove around the head for hafting by an entirely different method.

A similar progressive history is illustrated in the pottery sequence from the rather delicately delineated Kana'a style design of the early period to the boldly executed

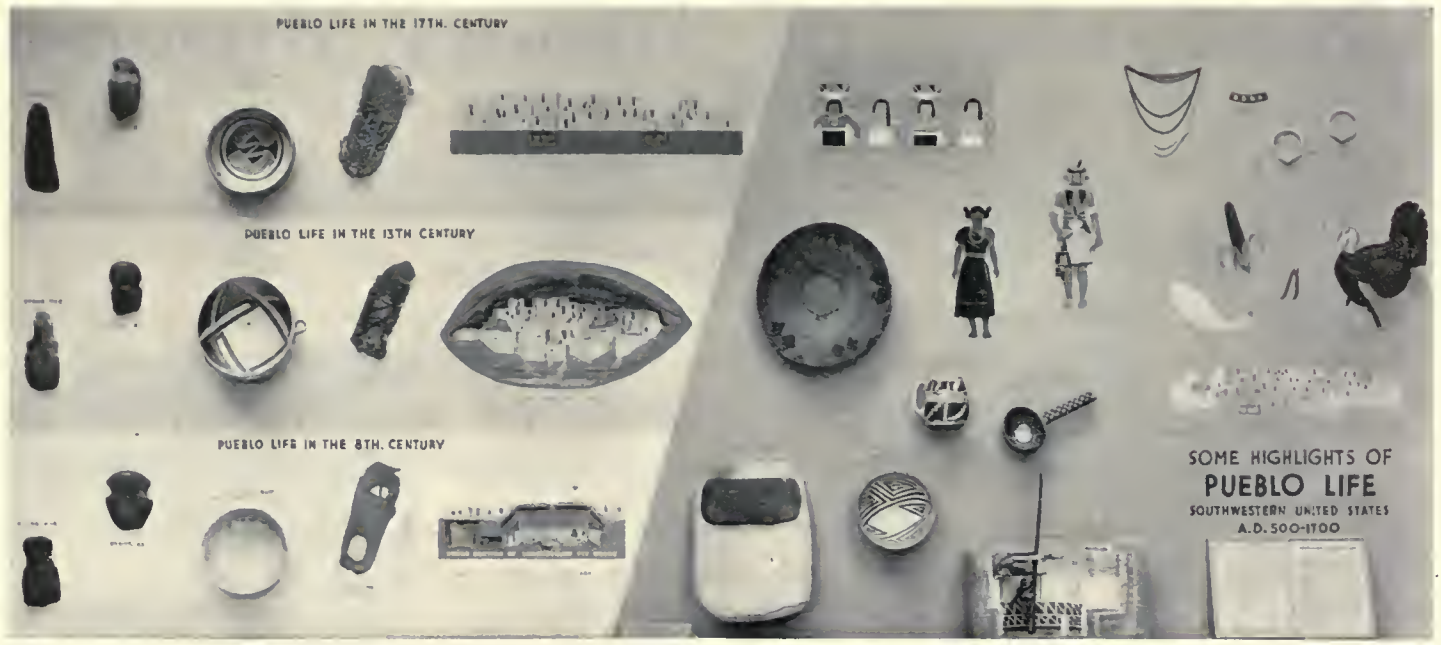
PUEBLO LIFE IN THE 17TH. CENTURY
PUEBLO LIFE IN THE 13TH CENTURY
PUEBLO LIFE IN THE 8TH. CENTURY
SOME HIGHLIGHTS OF
PUEBLO LIFE
SOUTHWESTERN UNITED STATES
A.D. 500-1700

EXHIBIT ILLUSTRATING HIGHLIGHTS OF PUEBLO INDIAN LIFE AND CUSTOMS, A.D. 500–1700

and richly colored Sikyatki polychrome of almost a thousand years later. On the other hand, the trend in sandal styles is retrogressive, going from the artistic tightly woven cord sandal with its unusual decoration (on both sides!) to the more coarsely woven undecorated examples of later times. However, in architecture we perceive a progression from one-story villages grouped about the underground pit houses, through the large many-storied terraced apartment house-towns located in caves and on mesa tops, to the larger aggregates of apartments symmetrically arranged around a central plaza and kivas.

In putting this exhibit together, we were limited by considerations of space and could include only the highlights in a long history of a relatively complex way of life that also had a large number of regional variations. The new exhibit was created by Mr. Gustav Dalstrom, artist in the Department of Anthropology, Mr. George I. Quimby, Curator of Exhibits, and the writer. Mr. Lee Rowell, dioramist, constructed the sectioned kiva model, illustrated on page 1 of this issue of the BULLETIN.

MUSEUM EXPEDITION DISCOVERS HIGHEST MOGOLLON SITE

The Museum's Archaeological Expedition to the Southwest, currently operating in western New Mexico, has discovered, at approximately 7,000 feet above sea level, the highest site of prehistoric Mogollon Indian culture known to date and is about to begin excavations upon it, it is reported by Dr. Paul S. Martin, Chief Curator of Anthropology and leader of the expedition.

The site, named "Promontory," was discovered by two members of the expedition, Dr. John Rinaldo, Assistant in Archaeology at this Museum, and Mr. E. B. Sayles of the University of Arizona and Arizona State Museum, who had been assigned to make an advance survey of the area. Their assignment—begun before Dr. Martin and the main body of the expedition arrived on the scene—was large. Their instructions had been to hunt for early sites, anything from the Pine Lawn phase of Mogollon culture (A.D. 500) back to the early Cochise culture (13000 B.C.). They were also assigned to map all sites found and by examination of the surface finds of artifacts in the area to try to approximate an idea of its past history.

The area surveyed, practically foot by foot, is one of some ten square miles in the vicinity of the small community of Reserve. To archaeologists, this tedious and exacting task is "a problem and end in itself aside from being a necessary preparatory job before actual excavations commence," in the words of Leonard G. Johnson, a member of the expedition. Adding to the difficulties was the fact that the area is one with tall pines, pinyons and fir trees, small bushes, and rocky terrain with water confined to a few underground springs. To reach it, the two surveyors had to make a long, steep climb under the scorching rays of the New Mexico sun. For this work, they were dressed like gold prospectors or ranchers on the trail of "strays," and as they proceeded they filled the pockets of their blue denim work trousers and their shirts with heavy loads of stone chips made by ancient man and potsherds (bits of pottery) that they retrieved from the ground. Covering the entire ridge top were tons of boulders, half buried and half hidden by the hardy yellow-greenish straw grass.

At the 7,000-foot level, an abundance of potsherds representing the undecorated pottery of the Mogollon culture was found. These and the stone tools found on the surface, together with a few shallow depressions noted, indicated that an ancient village of pit houses once occupied the site. Mr. Sayles deduced that the early Indians lived in the high ridges possibly for defensive purposes, possibly because, like modern penthouse dwellers, they wanted a view.

The great thickness of the potsherds plus the unusual elevation of the village seemed to indicate that it was of an early stage. Dr. Martin and his associates are now faced with the questions: Where had these Indians come from? and at what date approximately was the site occupied? The excavations of Promontory site, now beginning, may answer these and other questions.

Fossils in Floor

Not all the invertebrate fossils in the Museum are confined to cases in Hall 37. The marble (actually a limestone) of which some of the floors and stairs are made contains fossil shells, seen as sections on the polished surface. Perhaps the most readily recognizable fossil thus to be found is *Archimedes*, a bryozoan with a spiral or screw-like shape, reaching a length of several inches and visible in many of the steps throughout the building.

The famous Natural Bridge of Virginia is represented in a model in Clarence Buckingham Hall (Hall 35).

GIANT GALAPAGOS LAND TURTLE, TERRAPIN OF THE SQUARE-RIGGERS' MESS

By KARL P. SCHMIDT
CHIEF CURATOR, DEPARTMENT OF ZOOLOGY

The Galapagos Islands, 600 miles off the Ecuadorian coast, take their name from the Spanish word for giant turtle. It was and remains an extraordinarily appropriate name, for every voyager who has visited the islands since their discovery has commented on the remarkable large land turtles that feed on the cactus of the barren volcanic slopes like sheep feeding in a hillside pasture in some civilized landscape. The Galapagos Archipelago was entirely uninhabited by man when discovered, and none of the smaller islands have been colonized, several even of the larger ones being essentially without human inhabitants to this day.

The islands are famous in the history of science for the fact that their remarkable birds and reptiles caught the attention of the young Charles Darwin on his visit with the *Beagle* in 1835. He was interested in the differences between birds of these islands and adjacent islands, in the relations of the island life as a whole with that of South America—relations that underlie conspicuous differences—and in the archaic aspect of the island lizards and turtles. He was so much impressed with his observations and with the problems posed as to the origin and relations of such island forms that thoughts about them continued to revolve in his mind, and the Galapagos observations found a niche in his arguments about *The Origin of Species* in 1859.

IDEAL SHIPBOARD 'LIVESTOCK'

The giant land turtles of the Galapagos have great intrinsic interest and romantic and tragic history of their own, aside from their role in the problem of the history of the species. They were reported by Fray Tomas in 1535 on the occasion of the discovery of the islands. The first detailed description by William Dampier, in 1684, forecasts the extremely practical nature of the interest taken in the turtles by early voyagers in general and finally by the whalers of the early part of the 19th century. This lay in their use as food, for turtles offered a free and easily obtained supply of fresh meat to sailors living on "salt horse" and had the extraordinary merit, in sailing-ship days, that they could live for months without food or water.

Dampier writes: "The Spaniards when they first discovered these islands, found multitudes of land turtles or tortoise, and named them the Gallipagos islands. I do believe there is no place in the world that is so plentifully stored with these animals. The land-turtle are here so numerous, that five or six hundred men might subsist on them alone for several months, without any other sort of provision: They are extraordinary large and fat, and so sweet, that no pullet eats more pleasantly. One of the largest of these creatures will weigh one hundred fifty or two hundred weight, and some of them are two feet or two feet six inches over the callapee or belly." [Dampier's use of the words "turtle" and "tortoise" illustrates a continuing confusion in the use of these terms, since in English the word "turtle" was originally reserved for the marine forms. *Turtle* and *tortoise* are essentially interchangeable, since even the ornamental shell of one of the marine turtles is usually known as "tortoise shell." The attempt by some writers to restrict the term tortoise to land turtles now violates common usage as much as does the older restriction of "turtle."]

The giant land turtles did, in fact, reach a much larger size, three hundred to four hundred pounds being fair adult weights for the larger races, with occasional gigantic old turtle patriarchs that must have reached seven or eight hundred pounds. Indeed, a turtle foot from a specimen that had been killed and eaten on Indefatigable Island, one of the larger Galapagos Islands, obtained by the Cornelius Crane Pacific Expedition, measured no less than seven and one-quarter inches across and indicates that it may have belonged to a thousand-pound super-giant among the turtle giants.

HISTORY OF EXTINCTION

The value of the turtles as food was tragic for their persistence as species. Early visitors to the islands carried away some hundreds of specimens; when the whalers came, some on four-year-long voyages, the numbers taken grew to thousands. C. H. Townsend, late Director of the New York Aquarium, searched the logbooks of seventy-nine New England whaling vessels that visited the Galapagos between 1831 and 1868 for entries regarding the turtles (under the variously spelled American name "terrapin") and found positive record of the taking of 13,013. This, of course, is only an indication of the vast numbers taken by American and British vessels in the whaling era. Unfortunately for the turtles, their fat may be tried out to make an excellent clear cooking oil. After the discovery of the uses of petroleum and the decline of tropical whaling, the remaining turtle populations were preyed upon by Ecuadorian oil-gatherers, who killed further thousands of turtles for the sake of a few pints of oil from each. Even so, the almost incredibly rough lava terrain of the volcanic slopes would have preserved the turtles despite their continued destruction by man; but the introduction on the larger islands of domestic dogs, which soon escaped to form quite distinct feral races, supplied an enemy more persistent than man, an enemy that devoured the eggs and young where man had taken only the larger specimens.

The role of turtle enemies is sadly rounded out by the scientific collectors, who came in the 1890's and in the early decades of the 20th century to collect systematically for various museums, where collections had previously grown up only by chance, by

GALAPAGOS TURTLE IMMORTALIZED IN PLASTIC

Most recent addition to the exhibits of reptiles in Albert W. Harris Hall (Hall 18). Prepared by Staff Taxidermists Leon L. Walters and Julius Friesser.

U. S. TURTLE MEETS GIANT COUSIN

The Galapagos turtle model looms gigantically over its small quite close relative, a live Texas gopher turtle, gently restrained by June Buchwald of the Museum staff.

gifts of specimens from travelers, and at second hand from zoos. It is true that the feral dogs and cats are such potent enemies that it may well be justifiable to preserve the last remaining specimens of some of the declining species in zoological gardens.

The scientific importance of these island turtles lies perhaps mainly in their contribution to the very problem of the origin of species that so much impressed Charles Darwin. Darwin suspected, as has subsequently been confirmed, that there were several species of the turtles. As specimens were studied with accurately known origin, it became evident that each of the islands is inhabited by a recognizably distinct form of turtle, and that on the large island of Albemarle, which has been formed by the confluence of five distinct volcanic centers, there were, indeed, five races of the turtles. Since the marine turtles that are abundant in Galapagos waters exhibit no trace of such island differentiation, the lesson as to the importance of geographic isolation in the basic evolutionary process is impressive.

LONGEVITY OF TURTLES

A great and quite justifiable popular interest attaches to these large reptiles for their longevity. Even the smaller species of turtles tend to be long lived; the great land turtles of the Galapagos (with the corresponding forms on islands in the Indian Ocean) have a life expectancy of much more than a hundred years, perhaps of two hundred years.

The most reliable actual report of great age in one of these creatures refers to an individual Indian Ocean turtle known as "Marion's Tortoise." A large turtle with four others was taken alive to the Island of Mauritius in the year 1766 by the French explorer, Marion de Fresne. One of these specimens was mentioned on the occasion of the capture of Mauritius by the British in 1810; and all records indicate that this turtle lived on at the Artillery Barracks until 1918, when, apparently blind from age, it fell into a gun emplacement and was killed. The remains are preserved in the British Museum in London. Thus this turtle was known for 152 years, and its estimated age at death is between 200 and 250 years.

EXPEDITION RESCUES TWO

The Crane Pacific Expedition of Chicago Natural History Museum, in 1929, was happy in any case to rescue two small living specimens, weighing respectively 28 and 30 pounds, from the Norwegian fishermen settled at Academy Bay on Indefatigable Island. We exchanged flour and canned vegetables for the turtles, and the settlers seemed most pleased with their bargain. Had we arrived a few weeks earlier we might have obtained the gigantic turtle of which only the soles of the feet remained!

The two turtles sailed with us to Tahiti. There we boxed them and shipped them alive to Chicago, hopefully remembering their reputation for traveling for months without food or water in the holds of the whaling ships. They survived the journey and became acclimated in the new reptile house of the Brookfield Zoo. There they flourished, one of them growing in 18 years to a weight of 360 pounds, and still surviving. One specimen died in 1941 and was returned to the Museum. It served as model for the celluloid replica now placed on exhibition in Hall 18. The model in cellulose acetate is the work of Staff Taxidermists Julius Friesser and Leon L. Walters.

NEW GRAVEYARD OF FOSSIL VERTEBRATES IN WYOMING

By RAINER ZANGERL
CURATOR OF FOSSIL REPTILES

Once in a great while a veritable graveyard of fossil vertebrates is found. Many sites have become world famous in the course of time. A visitor to a paleontological museum collection in the United States could hardly fail to see the impressive rhinoceros slabs that are now exhibited in nearly every museum. These slabs show large numbers of disarticulated rhinoceros skeletons with the bones mixed up and tightly crowded together.

Recently another vertebrate graveyard was discovered by a Chicago Natural History Museum expedition in the Washakie formation of late Eocene age in southern Wyoming. In this case, the burial ground contains probably countless thousands of swamp and river turtles, a few crocodiles, and fishes similar to the living gar pikes. The turtle remains are preserved in all stages of disarticulation, belong to individuals of all sizes, and represent at least three species.

The specimens are so tightly packed together in the one level in which they occur that more than forty individuals were counted in an area of about three square yards. The extent of the graveyard known at present is considerable; the fossil-bearing level could be traced over an area of at least one-quarter square mile. What were the circumstances that led to the aggregation of such vast numbers of animals in relatively small areas? What killed them all at once?

Fig. 1. Mystriosaurus bollensis (Steneosaurus bollensis), a superb specimen of a Liassic crocodilian from the region of Holzmaden, southern Germany. The specimen is on exhibition in Hall 38.

STUDIES OF FOSSILIZATION

Answers to these questions, naturally, vary with each specific case. The circumstances responsible for the destruction and subsequent burial of the turtles and crocodiles in Wyoming were certainly very different from those that brought about death and final deposition of the rhino herd in Nebraska. Much has been written about fossilization, and at least one author, Deecke, has made field observations on death and burial of animals at the present time, observations that are of immeasurable value in the interpretation of peculiarities of preservation in fossils.

On the other hand, there are very few accurate records on the occurrence of fossils in any given formation. As an outstanding exception to this, the careful records kept and subsequently published by Dr. Bernhard Hauff on the occurrence of fossils in the marine early Jurassic (so-called Lias) in the region of Holzmaden in southern Germany merit brief discussion. This formation (*Fig. 1*) has produced some of the most beautifully preserved fossil vertebrates exhibited in all major museums.

In the region east of the town of Holz-

Fig. 2. Sketch showing the exact position of the good skeletons that were discovered in Pit No. 16, Lias formation near Holzmaden, Germany. From Hauff, 1921, Palaeontographica, vol. 64.

maden and south of the industrial town of Göppingen, the dark bituminous shales of the Lias formation are buried in horizontal position below the top soil and have been commercially mined for a long time. Hauff, a local resident of Holzmaden, became interested early in the mining activities and particularly in the rich fauna of fossils that occur in the formation, and while he collected, prepared, and sold his finds, his interests were, most fortunately for paleontology, scientific as well.

CAREFUL RECORDS MADE

Hauff studied the vertical extent of the shales accurately, classified them into groups and minute subdivisions of the latter, and labeled each level accordingly, so that each of his shale horizons could be determined in the thirty-odd pits that were dug in the area of Holzmaden. Whenever a fossil was found, the number of the pit and the exact designation of the level in which it lay was affixed to its label, and all this information, together with the identification of the specimen, was put down on record. Naturally, records were also kept for specimens that were not well-enough preserved to merit preparation or had otherwise no sale value. Hauff, furthermore, made maps of the region indicating the location of the various pits and, whenever a good vertebrate skeleton was discovered, he sketched its position and approximate state of preservation on these maps, projecting all the good skeletons of all the fossil-bearing levels onto one plane.

These skeletons were all found in an area of 1,782 square yards, in about 5,180 cubic yards of rock. Another sketch (*Fig. 2*) by Hauff gives the exact position of the good skeletons in pits Nos. 3–31, in their relative location to one another. This shows the arrangement and state of preservation of the better specimens over about two square miles of formation. At the time of publication, 1921, data gathered over more than thirty years had accumulated. In appreciation of his merits in the careful collection of this highly valuable information, Hauff was given an honorary doctor's degree.

As a result of this effort, it is now possible to reconstruct rather accurately the general geographic and faunistic conditions that prevailed at the time when these strata were deposited. To mention just a few, it is possible to say with certainty that there were no major ground currents in the Lias sea in the region of Holzmaden, because the position of the skeletons to the compass directions is totally irregular. Furthermore, the depth of the water must have been considerable, since there is no evidence of wave ground action. The preservation of the skeletons suggests a bottom mud, in which only anaerobic bacteria could live and decompose the carcasses. On the other hand, this ocean pocket was not too far away from land, since the fossils include such land animals as flying reptiles and forms that almost certainly frequented freshwater pools and streams.

The general conditions at Holzmaden are rather complex and formations of this kind are not very common. Thus the data and conclusions reached from them are of little use in different types of formations, such as lake, swamp, or land deposits. Our knowledge of conditions of fossilization in formations such as these is, in spite of many observations, far less systematic and much needs yet to be learned. Graveyards of vertebrates such as the one discovered in Wyoming hold a wealth of information that can rarely be obtained otherwise. The deposits there are largely stream borne; to a somewhat lesser degree they accumulated as swamp bottoms. The rock in which the turtles are buried is a fine sandy clay of fairly uniform character throughout the fossil-bearing level. The condition of the fossils themselves, in different phases of disarticulation, suggests that the animals were dead when buried, but not for too long a time. Obviously the carcasses were transported to the present burial site, most likely by a spring flood. What killed the animals is difficult to determine, but it is known that present-day turtles sometimes die in large numbers when caught by a severe premature freeze, before they have time to protect themselves in a suitable manner.

ORE PROCESSING EXHIBITS

Two exhibits of models, one representing the evolution of the blast furnace for smelting iron ore, the other showing the interior of an Arizona gold mine and a stamp mill for the extraction of free gold from crude ore, have recently been reinstalled in the Hall of Economic Geology (Hall 36).

The blast furnace exhibit includes three models representing the hot blast furnace of today, the cold blast furnace of seventy years ago, and the Catalan forge in which iron was smelted 150 years ago. They are arranged side by side in one case and labeled to enable the visitor to compare readily the great advances made in smelting of iron and to comprehend the steps involved in the extraction of iron from crude ores.

The models of the Arizona gold mine and of the stamp mill, installed in a single case, illustrate the common features present in the great majority of metal mines and the manner by which many ores are extracted and processed.

LIbrary Notes

The Museum Library recently has received shipments from the Preussische Akademie der Wissenschaften, the Senckenbergisches Museum, the Deutsche Morgenländische Gesellschaft, and the Museum für Völkerkunde. It is remarkable that learned societies and institutions were able to carry on their activities in the midst of war to the extent they did. Publication in Germany seems not to have been seriously interrupted until well into 1944, and earlier shipments of material from France, Holland, and Belgium indicate that scientific activity continued even during the darkest crises.

For the conservationist, the acquisition by the Library of a complete set of the *Journal of Wildlife Management* to date is an event of some importance.

Chicago Natural History Museum

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THEODOR JUST.....*Chief Curator of Botany*
SHARAT K. ROY.....*Chief Curator of Geology*
KARL P. SCHMIDT.....*Chief Curator of Zoology*

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Members are requested to inform the Museum promptly of changes of address.

SPRING AND EARLY SUMMER FLOWERING RECORDS, 1947

BY JULIAN A. STEYERMARK
ASSISTANT CURATOR OF THE HERBARIUM

The spring and early summer of 1947 will go down in the annals of the United States as among the wettest and most backward on record. Floods throughout the Middle West were the worst in 103 years. Farmers throughout this region were forced to plant their crops of corn either very much later than normally or had to abandon hope of even planting their fields too long inundated by flood water. In many places, acres of wheat ready to harvest were left to spoil as high waters prevented farmers from using their machinery in these fields.

Flowering plants, too, were late in reaching their average time of flowering. The spring flowering season around Chicago starts from one to three months later than in most of the southern states and the areas as far north as the edge of the Ozarks and Great Smoky Mountains. Even as close to Chicago as Springfield, Illinois, the season is about two to three weeks ahead. Thus, by experience we are accustomed to expect the spring flowering season to begin much later than southward. This year, however, the appearance of the first spring flowers was greatly delayed. So late, in fact, were this year's spring and early summer that many interesting data of local significance can now be reported.

Two general facts stand out clearly. First, this year's flowering dates are among the latest on record, being one to several months behind normal records. Secondly, as a result of cool weather and frequent rains, many plants ordinarily out of bloom were still in flower while others came into bloom. Thereby conspicuous overlaps in flowering time appeared this year. Ordinarily, squills (*Scilla*) are followed by hyacinths, hyacinths by tulips, tulips by lilacs and crabapples and irises, all representing different phases of spring and early summer. This year, however, tulips were still in bloom while lilacs, crabapples, and irises all flowered at the same time, and squill, one of the earliest, was still in bloom when tulips and other later flowering plants made their appearance.

An examination of the dates of flowering of some of the more common flowers reveals the contrast of this year with last year.* The crocus, one of the earliest of our cultivated garden flowers, did not come into bloom this year until April 13, while last year it was recorded on March 27. This year hepatica, one of the earliest native spring flowers, did not bloom until April 13, although last year the first flowering specimens were seen on March 24, and the year before that on March 19.

Rue anemone (*Anemonella thalictroides*), also an early spring bloomer, this year did not appear until April 24, although in 1946 it flowered on March 29, and in 1945 on March 22. In cool weather this species normally continues flowering for a long period. Actually this spring it flowered until June 14, for a period of 50 days. Daffodils were flowering this year between April 24 and May 1, whereas in 1946 they were in bloom on April 7, and in 1945 on March 31. Lilies of the valley were about a month behind this year, not coming into flower until May 25, while last year they flowered on May 1. This year tulips flowered on May 22, last year on April 17.

Similarly, the crabapple season was much delayed this year until June 1, compared with last year's first record for April 21. The purple trillium or wakerobin (*Trillium recurvatum*) bloomed this year on May 22, though last year it was out on April 25. Irises appeared this year on June 9, whereas last year they flowered on May 13. Delayed flowering during the first half of 1947 affected all flowering plants observed. Even skunk cabbage, normally the earliest wild flower of this region, this year did not flower until March 15, although in other years it was observed in flower as early as February.

Likewise in many parts of the United States the 1947 season was far behind normal as indicated by dates of flowering. The old expression, "Plant corn when the oak leaves are as big as squirrels' ears," is clearly based on the correlation known to exist between the flowering periods of plants and the prevailing weather conditions.

* Flowering dates recorded north of Barrington, Lake County, Illinois.

SUMMER GUIDE-LECTURE TOURS, MORNINGS AND AFTERNOONS

During August, conducted tours of the exhibits, under the guidance of staff lecturers, will be given on a special schedule, as follows:

Mondays: 11 A.M., The Earth's Green Mantle (General survey of the plant exhibits); 2 P.M., General Tour (Exhibition halls, all Departments).

Tuesdays: 11 A.M., The People of the World (General survey of the anthropology exhibits); 2 P.M., General Tour.

Wednesdays: 11 A.M., The Earth's Story (General survey of the geology exhibits); 2 P.M., General Tour.

Thursdays: 11 A.M. and 2 P.M., General Tours.

Fridays: 11 A.M., The World of Animals (General survey of the animal exhibits); 2 P.M., General Tour.

There are no tours given on Saturdays, Sundays, or on Monday, September 1 (Labor Day).

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Miss Florence Dibell Bartlett, Chicago—a collection of Guatemalan textiles and carved wooden manikins, and photographic negatives pertaining to the textiles.

Department of Botany:

From: Dr. Hugh Cutler, Chicago—39 herbarium specimens, Bolivia and Cuba.

Department of Geology:

From: Roy Eversole, Bitter Creek, Wyo.—a specimen of dakeite, Wyoming; Paul J. Woodcock, St. Clair, Mo.—a specimen of Drusy quartz and one of barite, Missouri.

Department of Zoology:

From: Chicago Zoological Society, Brookfield, Ill.—a Diana monkey.

Library:

From: Boardman Conover and Eugene S. Richardson, Jr., both of Chicago; Dr. Henry Field, Thomasville, Ga.; and James Lewis Kraft, New York.

Visitors from Abroad

Among recent notable visitors from abroad entertained by the Director of the Museum and members of the staff were Dr. Achille Urbain, director of the Museum National d'Histoire Naturelle, Paris, and Mr. Martin Noel, Argentinian architect and president of the Argentine Academy of Fine Arts, Buenos Aires.

TWO MORE SUMMER MOVIES OFFERED FOR CHILDREN

The annual summer series of free motion picture programs for children on Thursday mornings will continue for two weeks in August. The series is presented under the auspices of the James Nelson and Anna Louise Raymond Foundation. The programs feature films on natural history and travel.

The entertainments will be given in the James Simpson Theatre of the Museum at 10:30 A.M. Children are invited to come alone, accompanied by parents or other adults, or in groups from clubs and various centers. Admission is free. Following are the dates and titles of the films:

August 7—ADVENTURES OF CHICO
The story of a Mexican Indian boy.

August 14—ANIMAL TALES
Also a cartoon.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

Enchanted Streets. By Leonard Dubkin. Little, Brown and Company, Boston, 1947. 210 pages, illustrations, price $2.75.

When Leonard Dubkin was writing *Murmuring Wings*, he called at the office of the Chief Curator of Zoology in Chicago Natural History Museum to explore the possibilities of aid and advice from the Museum in his project. It was his intention to write a book about the familiar birds of the Chicago streets and parks. The Chief Curator eagerly seized upon this evident interest in birds with a variety of immediate suggestions as to how Mr. Dubkin might become an ornithologist—perhaps even an Ornithologist!—by studying bird anatomy at the Museum, by joining the Chicago Ornithological Society and the American Ornithologists Union, by a reading course in the Museum's notable Ayer Library on Ornithology, and by taking such university work in biology as would round out a desirable background for a zoologist specializing in birds. Mr. Dubkin, who wanted to write a book about birds and who was interested in human emotional reactions to birds—but only secondarily in the birds and not at all in the ornithologists he had encountered, made his escape. It is reported on good authority that his own account of this skirmish with the zoological world has become a quite hair-raising escape story.

Mr. Dubkin's *Enchanted Streets*, like his earlier book, represents an authentic type of nature writing, subjective and literary rather than scientific and objective. His work is to be compared with that of Richard Jefferies or even Henry David Thoreau, rather than with that of the half-literary, half-scientific essayists so often evolved in museum circles. Mr. Dubkin's children or grandchildren might perhaps produce the great natural history of the Chicago Region, in which man is accepted as a part of nature and for which a model is provided in the recent *London's Natural History*.

Enchanted Streets, with a few negligible errors of fact and interpretation, actually is a book of great value to scientists, who, for the most part, write badly and who urgently need someone like Dubkin to present to the general public the fact that rats and mice and insects and park pigeons may provide fulcrums for the levers of science, art, and philosophy.

—KARL P. SCHMIDT

Technical Publications Issued

The following technical publications were issued by the Museum during the last month:

Anthropological Series, Vol. 32, No. 3. *The SU Site, Excavations at a Mogollon Village, Western New Mexico, Third Season, 1946.* By Paul S. Martin and John B. Rinaldo. June 6, 1947. 110 pages, 42 halftones, 12 maps. $2.50.

Fieldiana—Zoology, Vol. 31, No. 16. *The Bacula of Some Fruit Bats (Pteropus).* By D. Dwight Davis. May 14, 1947. 8 pages, 2 text figures. $0.10.

Fieldiana—Zoology, Vol. 31, No. 17. *Geographical Races of the Rodent Akodon Jelskii Thomas.* By Colin Campbell Sanborn. May 14, 1947. 10 pages, one text figure. $0.10.

Dr. B. E. Dahlgren Returns With Cuban Collections

Dr. B. E. Dahlgren, Curator Emeritus of Botany, has recently returned from a five-month excursion to Cuba undertaken for the purpose of obtaining first-hand observations and material for the study of the many species of palms that are found there.

In his field work on the island, Dr. Dahlgren enjoyed the advantage of the company and collaboration of the distinguished Cuban botanist, Brother León, of Colegio de La Salle, whose unique knowledge of the island has been acquired in the course of a life-long study of the flora of Cuba, especially of its palms, many of which were unknown to science until discovered and described by him.

The collections and many photographs now made in Cuba will enrich the Museum's palm herbarium and furnish especially desired material for cytological research.

STAFF NOTES

Mr. Emil Sella, Chief Preparator, Department of Botany, was appointed Curator of Exhibits for the Department, effective July 1. **Mr. J. S. Daston** was transferred from Assistant in Economic Collections to Assistant in Botany, effective the same date. . . . **Mr. John W. Moyer**, Chief of the Division of Motion Pictures, left July 14 on a month's field trip to New Mexico, where he is making color films of pit-house excavations by the Archaeological Expedition to the Southwest under the direction of **Dr. Paul S. Martin**, Chief Curator of Anthropology and leader of the expedition. Among other uses, the films will be shown at the Museum in November when Dr. Martin appears in the annual Autumn Course of Saturday afternoon lectures. . . . **Dr. Alexander Spoehr**, Curator of Oceanic Ethnology, has returned from his expedition to the Marshall Islands. . . . **Mr. Donald Collier**, Curator of South American Ethnology and Archaeology, attended a conference last month in New York on Peruvian archaeology, sponsored by the Institute of Andean Research and the Viking Fund.

NEW MEMBERS

The following persons became Members of the Museum during the period from June 16 to July 15:

Associate Members

Sam J. Eisenberg, Louis Hollenbach, Mrs. Alfred Stern, Ernest H. Thompson.

Non-Resident Associate Members

Dr. Eliot F. Porter

Sustaining Members

Kenneth Kroehler
Mrs. James W. Thorne

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The sources of the world's most important beverages, both alcoholic and non-alcoholic, are illustrated in the Hall of Food Plants (Hall 25).

FOOD PLANTS OF THE ANDES

By HUGH C. CUTLER
CURATOR OF ECONOMIC BOTANY

Throughout the Andes the traveler finds remains of civilizations whose members often surpassed in numbers, skill, and artistic feeling the present population. It is difficult to understand how a large population could have existed in these lands where rainfall is scanty and the soil rocky and where the temperature frequently varies 50 degrees in a few hours. Here only a few edible wild plants grew and wild animals were scarce. Yet a large part of the Andes was inhabited by peoples who not only lived there but found enough time and energy to build monumental structures and to develop artistic and technical skills.

Only the cultivation of plants especially adapted to the highlands enabled these civilizations to survive. Their skill in farming and in the selection of plants is shown by the large numbers of known varieties of the principal crops. In this area more than 400 named varieties of potatoes occur, and the variation within some of these varieties is almost as great as that in all the potatoes of the United States.

We know what foods these ancient peoples used. In the dry western foothills of the Andes, remains of the actual plants are often dug out of the old ruins. Sometimes these plants are found in rubbish heaps, together with broken pots, old clothes, ashes, and charcoal. Occasionally jars of food or seed are found. These appear to have been storage vessels that had been forgotten or abandoned. Food was often placed in graves.

ARCHAEOLOGICAL TRACES

Even where the climatic conditions were unfavorable for the preservation of vegetal material, we can occasionally find modeled replicas of fruits, vegetables, and seeds, or vessels decorated with figures of the foods. The best examples of vessels showing food plants are from the Chimu culture of northwestern Peru. These are shown in Case 21 in the Hall of South American Archaeology (Hall 9) on the first floor. The most interesting vessels are in the form of food plants modeled with remarkable skill and fidelity. These representations can be identified with certainty, but when the plant is represented in a painting or in a design woven in cloth, the design is often so stylized that it is difficult to distinguish the plant.

Besides the evidence left by the old inhabitants, we can gather some information on ancient foods from records left by the Spanish conquerors, rulers, and priests. The first Spaniards were mainly soldiers and left very few references to foods. When they did write about plants, they often applied the names they had learned in Cuba and Central America, and their descriptions were brief and often inaccurate. Some of the names introduced from the Caribbean area, such as *maís* (like our word "maize"), have spread throughout Spanish America and in many places replace the native word.

More accurate records of plants and food habits were made when Spanish rule of the countries had been established. By this time, however, many plants had been introduced and later writers often could not determine which plants were indigenous.

LIVE AS IN PREHISTORIC DAYS

Many of the Indians live today as they did before the Spanish invasion. There is very little difference between the Inca village shown in Hall B on the ground floor and the Indian communities of the present. The descendants of the Inca tribes may use metal points on their hoes and see airliners fly overhead; yet they still live on their ancient foods and speak their Indian language. From them we can secure living plants for our studies and specimens for comparison with the prehistoric remains.

ANCIENT PERUVIAN GOD—

—clothed in a cloak of maize to symbolize fertility. Statue in Hall of Food Plants (Hall 25). Other similar gods and goddesses are represented in the Central and South American collections of the Department of Anthropology (Halls 8 and 9).

In the highest parts of the Andes the principal food is the potato. The numerous cultivated varieties belong to several species. Wild potatoes are occasionally harvested and some of these are hard to distinguish from cultivated varieties. Most of these wild potatoes and many of the cultivated ones must be treated to remove a bitter taste. This is usually done by soaking them in water, letting them freeze during the cold nights, and then stamping out the water. After the potatoes are dried they can be stored for many years before using. The best dried potatoes are called *tuntcha* and the most common type is called *chuño*.

Many potatoes, especially the larger ones, are eaten immediately. All potatoes taste insipid when they are prepared in the highlands where water boils at 175 degrees, and several hours are needed before they are cooked. But if Andean potatoes are prepared near sea level or in a pressure cooker, some have flavor and texture superior to the potatoes of the United States.

NASTURTIUMS AS FOOD

A peculiar food plant of the Andean highlands is a nasturtium with large tubers. Just as in the potato, there are wild species of nasturtium, and the difference between wild and cultivated ones is often very slight. The nasturtium we grow for flowers is also grown in Peru but the flowers are eaten in salad unless used for ornamental purposes.

In the highlands where corn could not grow and in places where the soil was poor, a close relative of the common pigweed of the United States was grown. This plant, called *quinoa*, has been found in some of the oldest ruins on the Pacific slopes. *Quinoa* should not be confused with quinine, the tree whose bark is used as a preventative and cure for malaria. Both *quinoa* and quinine are native in the Andes.

The importance of *quinoa* is diminishing because it is difficult to prepare and has a low market value. Barley replaces it on the better soils, provided there is sufficient rainfall.

The principal food of nearly all the major Indian civilizations was corn. It is still the most important plant of the Americas and is grown in more varied habitats than any other important food. Corn is planted near Lake Titicaca at altitudes of 13,000 feet, on the lowlands near sea level, in deserts with ten inches of rainfall per year, and in tropical forests with 96 inches of rainfall per year. Besides varieties for special climates, there are varieties for definite uses. One of these has a purple dye used for fabrics and drinks.

CORN AS ART MOTIF

Because corn was so important, there is much old pottery decorated with designs based on ears of corn. Small clay models, which were probably used as offerings to insure good crops, are often found. One of these clay models was erroneously described as a fossil ear of corn. This mistake is readily explained because some of the models are so accurately made that even the place where the silks were attached is shown. For many years the clay model was considered a real fossil but finally when cut open was found to be only a clay rattle.

A similar ancient clay model is exhibited in Case 12 of Hall 25 (Food Plants and Palms), together with a pottery jar made about 1,000 years ago in coastal Peru. Other cases in Hall 25 contain models of native American food plants in use today.

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SOME ANCIENT 'DPs' OF NEW MEXICO

By LEONARD G. JOHNSON
(MEMBER OF THE MUSEUM'S ARCHAEOLOGICAL EXPEDITION TO THE SOUTHWEST, 1947)

Five thousand years ago the primitive Cochise Indians of southern Arizona packed their few possessions and moved north far into New Mexico. It apparently was not a political displacement but, rather, an economic one. "This movement was due to the rain-gods' lack of co-operation," says Dr. Paul S. Martin, Chief Curator of Anthropology and leader of the Museum's Archaeological Expedition to the Southwest, which is still in the field.

The erosion that has done and is continuing to do so much damage throughout the Southwest has been quietly working for the archaeologists during the last fifty years. It has revealed a camp site that thousands of years ago had been the stamping grounds of the ancient Cochise Indians, who, forced to leave Arizona for lack of water, had journeyed hundreds of miles before finding a small permanent stream in the mountains of west central New Mexico. How long they stayed in the vicinity of Wet Leggett Canyon, ten miles from what is now Reserve, New Mexico, nobody knows, for all that remains of these Indians is a few stone tools, so crude that the layman would have a hard time distinguishing them from ordinary river boulders.

On their way to the Museum and soon to be placed on exhibition are the grinding stones, choppers, scrapers, and arrowheads of these people. All else that may have played an important part in the life of these early Indians is lost forever. Only stone was able to resist the ravages of time and weather.

The few stone tools, regarded by the expedition personnel as the oldest and most important Indian find made by the Museum in many years, were dated geologically through the old gravel beds in which the artifacts were found. They were embedded six feet below the surface in very hard, cement-like material. With a combination of good luck and years of experience, Mr. E. B. Sayles, of the University of Arizona and Arizona State Museum, and Dr. John Rinaldo, Assistant in Archaeology at the Chicago Museum, authorities on ancient man in the New World, discovered this material.

"Although Cochise material has been found in southern Arizona, this is the first indication of these people in New Mexico,"

(*Continued on page 8, col. 1*)

SCENE ON THE 'DIG,' ARCHAEOLOGICAL EXPEDITION TO THE SOUTHWEST, 1947
Members of the expedition in Wet Leggett Canyon near Reserve, New Mexico, excavating the ancient implements that revealed the presence of a tribe of "displaced persons" that came from Arizona some 5,000 years ago. (Museum Expedition photo.)

MICRONESIA EXPEDITION COMPLETES WORK

By ALEXANDER SPOEHR
CURATOR OF OCEANIC ETHNOLOGY AND LEADER OF THE EXPEDITION

The 1947 Ethnological Expedition to the Marshall Islands in Micronesia marked the return of the Museum to active field work in the anthropology of the Pacific. The Museum has maintained a long-standing interest in the study of Pacific peoples, dating back to the early years of the century. The 1947 expedition to the Marshall Islands has just completed its field season. The following is a preview of its results.

In addition to their basic theoretical importance, anthropological studies in that part of the Pacific islands known as Micronesia have today an added significance. Micronesia encompasses the islands of the former Japanese mandate. At the close of hostilities with Japan, the United States was in possession of these islands, and at present has assumed the responsibility for the administration of the native peoples of the area under an agreement with the United Nations. Yet our knowledge of the Micronesians is either nonexistent or inadequate.

Both for purposes of sound administration and for the formation of an intelligent public opinion in this country regarding the islands and their inhabitants it is essential that a well organized, up-to-date body of scientific information be available. It is the job of the professional anthropologist to provide this information.

Micronesia—the land of small islands—is composed of three principal groups: the

YACHTLIKE MARSHALLESE OUTRIGGER CANOE
(Museum Expedition photo)

Marshall Islands, the Caroline Islands, including the Palaus, and the Marianas. The Oceanic zone over which these islands are scattered is larger than the United States, but the total land area is only about 1,000 square miles. The Marshall Islands themselves are composed of thirty-four low-lying coral atolls and islands covering nearly 375,000 square miles, but with a combined land area of only 75 square miles. The population of the Marshalls totals approximately 11,000. In racial characteristics, the Marshallese are probably an early hybrid mixture, primarily of Caucasoid and Mongoloid elements, and are closely related both racially and culturally to the Polynesians of the vast island area to the east.

The work of the Museum expedition was concentrated at one atoll—Majuro. Majuro is a typical coral atoll—a ring of narrow islands and coral reef surrounding a clear blue lagoon that is approximately twenty-one miles long and from three to six miles across. To the Marshall islander, the lagoon is almost as much a part of his home atoll as the land itself. No more typical sight exists in the Marshalls than a cleanly designed outrigger canoe with its lateen sail billowing in the wind as it cuts through the sparkling waters of the lagoon.

Although Majuro was the scene of a major wartime Pacific base, the atoll fortunately escaped bombardment, and most of the land area remained free of the severe disruptions caused by base-building. The vegetation consists primarily of coconut palms, pandanus, breadfruit, and a few tropical hardwoods, together with low brush and grasses. Although Majuro is only seven degrees north of the equator, the northeast trade wind tempers the tropical climate. There is no malaria, and the people are healthy and happy.

The principal village is located on the atoll's largest island, called also by the name of Majuro. Here there lives a community of a little more than a thousand people. The houses of the villagers are scattered for a distance of two miles along the well-kept main road that stretches along the length of the island just back of the lagoon shore. Secondary roads also cross the island to the ocean side.

In the interior of the island and on the ocean shore there are also houses, but the lagoon shore location is on the windward side of the island, is cooler, and is preferred. The houses formerly were of thatch, but today the people have switched to modest homes constructed of sawed lumber, in large part salvaged from the former Navy base across the lagoon.

Public buildings in the village include a meeting house, a dispensary manned by a Marshallese medical practitioner, and a large well-built church. In addition, two co-operative stores partially fulfill the desire of the villagers for imported trade goods—such as needles, thread, cloth, canned meats, fish hooks, soap, and kerosene.

PURPOSE OF THE FIELD WORK

The field work was conducted at this village. What was the purpose of the expedition in coming to Majuro, and what was the aim of the anthropologist in carrying on his studies there?

Although the Marshallese were the subject of anthropological inquiry some forty years ago, Marshallese society and culture have changed greatly in the past four decades. Today the Marshallese cannot in any way be considered as a native people untouched by contact with the West. They wear Western-style clothes, are largely Christianized, build Western-style houses, and are familiar with the movies (shown at the Navy ships and stations) and popular songs of America.

Yet there remains a core of Marshallese culture that stems directly from native tradition, and modified though it may be, it is essentially Marshallese rather than Western. The question therefore arises as to how these culture elements of old and new have blended to form Marshallese culture of today. And what are the distinguishing characteristics not of Marshallese society as it once was, but as it is at the present moment? These were the questions that guided the work in the field.

The limitations of time made it necessary to concentrate effort at a single village, and considerations of transportation, communication, and supply led to the selection of Majuro as a type village for study.

What were the results of the field work? Space allows only a brief summary here. A full report will be issued in the Museum's scientific series.

The economic basis of Marshallese life still revolves around the old products of land and sea—the coconut, pandanus, breadfruit, taro, and fish. These provide the staples in the diet and the raw materials of handicraft. The principal change in the economic life is the development of trade relations with the outside world. Beginning with the German administration of the Marshalls prior to World War I, and becoming more marked under the Japanese thereafter, the Marshalls were drawn into the orbit of international trade. Although their resources were strictly limited, the Marshallese exported copra and woven pandanus mats and other handicraft in exchange for cloth, needles, thread, sewing machines, sugar, flour, rice, canned meat, fishing tackle, and a variety of manufactured products on which they have come to depend.

Associated with this development of foreign trade was the establishment of a money economy in trade relations with the outside world. On the other hand, within the village a system of gift exchange of goods and services, stemming from old economic practices, still prevails.

The Marshallese also continue to maintain a feudal class system of kings, nobles, and commoners, although class distinctions based on birth alone have been greatly modified and weakened in recent years. The system continues to survive largely because it is so closely tied to practices of land use and ownership. Land is the limited resource, and a complicated set of usages exists, defining the respective rights of kings, nobles, and commoners to the ownership of land and to its fruits.

CLAN SYSTEM CONTINUES

In most small communities the ties of kinship are widely extended and regulate much of social life. The Marshallese are no exception. The old clan system continues to exist. One belongs to the clan of one's mother, and everyone in one's own clan is considered a relative. Kinship ties are economically important, in that most co-operative groups are drawn from the

MARSHALL ISLANDER BUILDING FISHTRAP
(Museum Expedition photo)

(*Continued on page 8, col. 3*)

SCHOOLS WITHIN THE MUSEUM: ELEMENTARY TO UNIVERSITY

By H. B. HARTE
PUBLIC RELATIONS COUNSEL

WITH the arrival of September and the opening of the autumn term in grade schools, high schools, and colleges, it is appropriate to review some of the contributions of this Museum in the field of direct education. These activities constantly are being expanded.

Education, of course, is a year-around activity of the Museum. The millions of visitors who come into its halls are motivated, for the most part, solely by the desire for recreation. Nevertheless, they can scarcely avoid adding something to their own education as they view exhibits and read the accompanying labels. The absorption of knowledge in this manner, which probably takes place without conscious realization by most of those who come here, is an important educational process.

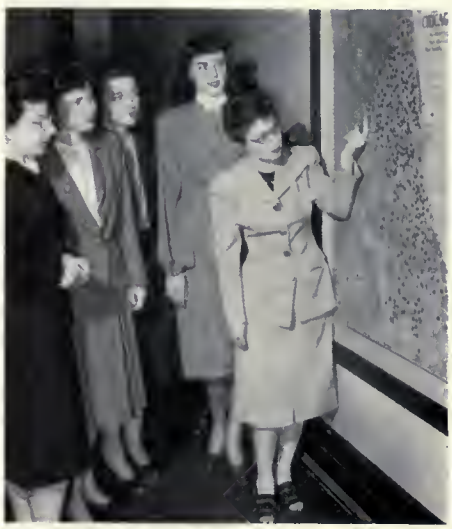

Photo courtesy Chicago Daily Times

MEET THE RAYMOND LECTURE STAFF. Daily in the newspapers and monthly in the Museum Bulletin appear the names of these young women and their lecture subjects. Left to right: Marie Svoboda, Winona Cosnee, Lorain Farmer, June Buchwald. Miriam Wood, Chief of the Raymond Foundation, is pointing to Chicago map indicating hundreds of schools for outside lecture assignments. Two other lecturers, Roberta Caldwell and Marie Pabst, were away when picture was taken for a recent newspaper "spread."

It is this educational effect through its recreational facilities that people in general are inclined to regard as the only function of the Museum. It is not widely enough recognized that there are two other primary lines of activity: (a) the extensive and important research program in many fields, conducted by the scientific staff in offices and laboratories hidden away from the public on the third and fourth floors of the Museum and by expeditions in the field; (b) a vast direct education program reaching hundreds of thousands of grade-school children and thousands of high-school and college students and adults in which the Museum functions as actual classroom or part of the campus.

Principal direct-education activities are:

1. Raymond Foundation

Varied and comprehensive are the activities of the James Nelson and Anna Louise Raymond Foundation, whose staff of seven lecturers gives natural-history lessons to about 115,000 grade-school children and high-school students in an average year. The work of the Foundation is supported by a $500,000 endowment, plus accretions, established by Mrs. James Nelson Raymond.

"AND THEY LIVED 30 MILLION YEARS AGO!"

Roberta Caldwell of Raymond Foundation staff tells story of prehistoric three-toed horse (Mesohippus) to children spellbound by Museum restoration.

Photo courtesy Chicago Daily Times

RAYMOND FOUNDATION GIRLS don't lecture all day, but they're kept busy in between. Here Lorain Farmer is drawing picture on stencil with stylus and mimeoscope for mimeographed "handout" to guide study group of children in Museum; Winona Cosnee offers suggestions.

The seven young women who compose the staff of the Raymond Foundation organize their lectures by consultation with members of the scientific staff, by surveys of Museum materials, and by studies in the Museum Library. Thus fully prepared, they conduct groups of school children on tours of the Museum exhibits. They go out into the schools of Chicago with slides and occasionally with motion picture films to present lectures in classrooms and school assembly halls. They prepare sheets of questions and suggested activities concerning Museum exhibits for groups of children visiting the Museum. For these, they draw their own illustrations and print the texts and pictures by means of mimeoscope and mimeograph, sometimes in several colors. They also write "Museum Stories for Children," which are published by the Museum Press and distributed free of charge to children at the Raymond Foundation's spring and autumn series of free Saturday motion picture programs in Simpson Theatre.

In addition to the work directly with children, Raymond Foundation staff members occasionally conduct nature courses for Boy and Girl Scout leaders, camp counselors, and school teachers, and special classes for advanced school pupils. In such courses they use Museum specimens for demonstration, on occasion even handling live snakes. Occasionally they may go on field trips within the Chicago area to collect specimens to illustrate lectures.

2. Adult Education

Some museums, particularly in the East and abroad, employ "docents" to conduct visitors on tours of their exhibits. Some museums have guides in uniform, whose bearing is all too reminiscent of the man with the megaphone on the sightseeing buses and whose memorized unvarying

Photo courtesy Chicago Daily News

"MUSEUM DAY" AT A SCHOOL. In each of nearly 500 Chicago schools—public, parochial, and private—children greet the N. W. Harris Extension truck bringing them a change of traveling exhibits every two weeks. Thus about 500,000 children are reached repeatedly throughout the school year.

"lecture" also too often recalls the busman's stereotyped "spiel."

Chicago Natural History Museum employs neither "docents" nor uniformed lecturers. Instead, it has hit upon what is thought to be the happiest solution of all. It has searched the universities and colleges to select young women who combine major achievement in the natural sciences with charm and the ability to speak informally and spontaneously. These young women meet their audiences as hostesses representing the Museum and, because their lectures follow an informal, conversational plan instead of a memorized set form, visitors may interrupt to ask questions or make remarks, as they would at a social gathering.

This gives to Museum guide-lectures a tone and quality not obtainable in any other way. It does not imply, however, any superficiality. On the contrary, each of the young women is a specialist in at least one field—anthropology, botany, geology, or zoology—as well as being equipped to impart information in any or all of them. As a result, countless visitors have commented, delightedly, on the difference between a guide-lecture tour as provided at this Museum and the usual sort of guidance and lecture offered in connection with most tourist attractions.

Another adult education activity of the Museum, one with which most Members of the institution are familiar, is the Saturday afternoon lecture courses in the Simpson Theatre in the Autumn and Spring.

3. The N. W. Harris Public School Extension

This is the department that takes the Museum right into the schools—the birds and small mammals and insects; the rocks and minerals and meteorites; the flowers, and the vegetable products upon which man largely depends for food and clothing. This is done by means of traveling exhibits of natural history and economic subjects, which on a small scale resemble the larger exhibits within the Museum itself.

Harris Extension cases are sent to practically every public, parochial, and special school in Chicago—approximately 500 of them—on a regular schedule: two cases at a time, with changes each two weeks, throughout the school year. In this way, some 500,000 children are reached, and reached repeatedly. The cases are used as school corridor and classroom displays, where the children may independently make observations, and in connection with classes engaged in nature study, biology, and related subjects.

There are about 1,100 traveling exhibits in circulation. New ones are constantly in preparation by the preparators in the Harris Extension laboratories. Many of the cases are small dioramas with colored photographic or painted scenic backgrounds.

The work is supported by a special endowment set up by the late Norman Wait Harris and added to by his son, Mr. Albert W. Harris, formerly a Trustee of the Museum, and other members of the Harris family. The contributions of the Harris family total more than $525,000.

4. Art Classes

The nature research classes of the Art Institute of Chicago—some for grade-school children, some for high-school and college-age students, and some for adults beyond the formal schooling stage—use the exhibits and facilities of the Museum in the study of drawing, painting, sculpture, and ceramics. The Art Institute groups have been provided with their own classroom in the Museum building. After lectures there from their instructors (members of the School of the Art Institute faculty who accompany them here), they disperse throughout the exhibition halls with sketchboards and easels.

5. Co-operation With Universities (and Museology Class)

Most of the universities and colleges in the Chicago area send classes and their instructors to the Museum to use the exhibits and study collections in connection with such studies as geology, paleontology, zoology, botany, anthropology. The Uni-

NATURE CLASS USES TRAVELING HARRIS EXTENSION EXHIBIT OF BATS

From study of specimens in case, children have made drawing of bat wing on blackboard at left.

Photo by John T. Newell, Chicago Board of Education

STUDENTS OF THREE SCHOOLS OF HIGHER LEARNING USE MUSEUM FACILITIES

(Upper left) John Pletinckx, Ceramic Restorer in Department of Anthropology, instructs Marie Esther Hermitte, who came from Argentina to join University of Chicago museology class, in method of piecing together fragments of ancient pottery. (Lower left) Two of the students in one of the adult classes sent to the Museum by the School of the Art Institute of Chicago, sketching animals in an exhibition hall. (Upper and lower right) "Work-Earn-and-Learn" students from Antioch College, Yellow Springs, Ohio. They alternate periods of formal study on the campus with periods of working for salaries. Lucille Hanford catalogues the birds' egg collection. Donald Stoops works as an assistant in the chemical laboratory for Geology.

versity of Chicago and Northwestern University, in particular, make wide use of these facilities.

An especially interesting division of this work is the University of Chicago's course in museology. This is composed of students, frequently including some from foreign countries, who are preparing themselves for life careers as curators, museum artisans, and museum directors. Three days a week are spent on the university campus in the usual arts and science courses of a university curriculum; two days a week the classes are held in the Museum, with members of the Museum staff as instructors. Laboratory requirements include actual work in the study and preparation of Museum specimens under the supervision of Museum people. During the course, the students are brought into contact with the personnel and methods employed in the operation of almost every division of the Museum—the scientific departments and such divisions as business administration, membership, publicity.

6. The "Study-Work-and-Earn" Group

This, the most recent direct-education program of the Museum, consists of a small group of students from Antioch College in Yellow Springs, Ohio. All students at that college divide their school year between periods of formal classroom work on the campus and periods of on-the-job training, with pay, in various types of businesses and in institutions all over the country. This Museum provides a few such positions for young men and women interested in its field, in which the students are actually on the Museum payroll. When one group goes back to the campus in Ohio, another group is sent to the Museum to replace those students in their jobs. Some of the students are employed in the scientific departments and some in the administrative offices of the Museum, in junior capacities.

Chicago Natural History Museum

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Members are requested to inform the Museum promptly of changes of address.

LIBRARY RECLASSIFICATION

The Board of Trustees has approved the project of reclassifying and recataloguing the Museum Library according to the Library of Congress Classification as rapidly as possible. The reasons for adopting this classification in preference to continuing with the Library's own scheme are several: The L.C. scheme has been developed by specialists in classification for actual application to a large collection of books; it is comprehensive, expansive, flexible, and practical; emanating as it does from a growing library, it is undergoing continuous amplification and revision; the fact that it is the classification scheme of our "national library" insures its continued development.

A great deal of attention has been given the problem of cataloguing costs. By adopting the L.C. Classification and cataloguing practice substantially without change, the Museum Library will be able to utilize the bibliographical work performed by the Library of Congress Processing Division. Eventually, this will result in economy of time and effort on the part of the staff and will permit greater attention to be given to other phases of the Library's activity.

The Library's collection of material on the Belgian Congo has been considerably strengthened by the receipt of a large block of publications of the Institut Royal Colonial Belge and of the Institut des Parcs Nationaux du Congo Belge. The latter groun contains the published results of the work of the several expeditions sponsored by the institute.

STAFF NOTES

Mr. Karl P. Schmidt, Chief Curator of Zoology, and **Mr. John W. Winn,** Assistant Curator of Fishes, as well as **Mr. Loren P. Woods,** Curator of Fishes (on leave of absence), attended the meetings of the American Society of Ichthyologists and Herpetologists at Higgins Lake, Michigan. Mr. Woods presented an account of the coral reef fishes of the Bikini Atoll, on which he is working under the direction of Dr. L. P. Schultz at the United States National Museum. Mr. Schmidt presented committee reports as representative of the society to the National Research Council. . . . **Mr. Philip Hershkovitz,** Assistant Curator of Mammals, and **Mr. Luis de la Torre,** temporary assistant, attended the meetings of the American Society of Mammalogists, August 25 to 27. . . . **Dr. Fritz Haas,** Curator of Lower Invertebrates, reports a very cordial reception at the Bermuda Biological Station for Research, where he has been joined by **Mr. Joseph B. Krstolich,** artist. Dr. Haas reports conditions for study of the marine fauna extremely favorable. . . . **Mr. Samuel H. Grove, Jr.** has been appointed a preparator in the plant reproduction laboratories of the Department of Botany, and **Mr. Harold Hinshaw** has been appointed assistant in the Herbarium.

Ecuador Botanist at Museum

For several weeks the Museum will be host to one of Ecuador's foremost scientists, Professor M. Acosta Solis, Director of the Ecuadorian Institute of Natural Sciences at Quito. Mr. Solis, who has made detailed studies of the vegetation of Ecuador and who recently gave the herbarium the largest collection of Ecuadorian plants ever received by this or any other institution, will be writing labels for the thousands of specimens so that they will be available for study and eventual insertion in the herbarium.

Change in Visiting Hours

On September 2, the day after Labor Day, autumn visiting hours, 9 A.M. to 5 P.M., go into effect at the Museum, continuing until October 31.

Interesting to all readers of *Robinson Crusoe* and other tales of adventure on "desert islands" is the breadfruit tree. An exhibit of breadfruit is a feature of Martin A. and Carrie Ryerson Hall (Hall 29).

PEIPING—SPECIAL EXHIBIT OF PHOTOS, SEPT. 1–30

"Peiping," a photographic exhibition prepared by the editors of *Life* magazine, will be placed on view at the Museum from September 1 to 30, inclusive. The pictures in the exhibit are devoted primarily to Peiping architecture and, although based on a photographic essay that recently appeared in the magazine, they include many not hitherto published.

The photographs were made by Mr. Dmitri Kessel, a *Life* staff photographer, during an assignment in the Far East. Mr. Kessel spent many weeks photographing the Chinese city's unique and beautiful architecture, which had suffered little from the hands of the Japanese during the war. Of the subject, the editors say: "The history of China's ancient capital began more than a thousand years before Christ. For centuries, its palaces and temples have been many times built, destroyed, rebuilt again. And although most of its present-day monuments go no further back than the 15th century, Peiping still stands, one of the great architectural cities of the world."

The exhibit will be on display in the south half of Stanley Field Hall. There are twenty-five panels, 28″x38″. In some instances, an entire panel is devoted to a single photograph, such as a superb view of the rooftops of the Forbidden City or the Inner Starry Wicket Gate to the Altar of Heaven.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Major Wang Ching-Yien, Chanute Field, Rantoul, Ill.—a rubbing from inscription on stone monument, T'ang dynasty, A.D. 841, China.

Department of Botany:

From: Dr. Hugh C. Cutler, Chicago—39 herbarium specimens, Bolivia and Cuba; Dr. Henry Field, Thomasville, Ga.—18 specimens of fungi, Georgia.

Department of Geology:

From: C. M. Barber, Flint, Mich.—specimens of *Plesiosaur*, Arkansas.

Department of Zoology:

From: Robert Guillaudeu, Chicago—17 frogs, lizards, and snakes, Illinois and Indiana; Lt. John F. Kurfess, Warrington, Fla.—34 snakes, Florida; J. E. Johnson, Jr., and John Sparks, Waco, Texas—232 snakes, frogs, lizards, salamanders, and turtles, Texas.

Library:

From: Margaret Conover, Stanley Field, and Eugene S. Richardson, Jr., all of Chicago; Henry Field, Thomasville, Ga.; Henry C. Hitt, Seattle; A. W. Jessep, Melbourne, Australia; National Research Council, Ottawa, Canada.

Raymond Foundation:

From: Charles Albee Howe, Homewood, Ill.—334 color slides.

ECONOMIC GEOLOGIST APPOINTED TO STAFF

Mr. Robert Kriss Wyant has been appointed to the staff of the Museum as Assistant Curator of Economic Geology and is scheduled to begin his duties September 1.

R. K. WYANT

Mr. Wyant is a graduate of the University of New Mexico, where he majored in geology and chemistry and earned his bachelor of science degree. Since then he has engaged in post-graduate work at the University of Chicago and has completed most of the requirements toward a doctorate.

In 1939–40 he was a chemist on the staff of the United States Geological Survey at Albuquerque, Mew Mexico, working on ground-water problems in that area. From 1941 to 1945, he was a production chemist with Todd and Brown, Inc., where his work was concerned with explosives manufactured by that company for the war services. He is a member of the American Institute of Mining and Metallurgical Engineers.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

Logbook for Grace (Whaling Brig *Daisy*, 1912–13). By Robert Cushman Murphy. The Macmillan Company, New York, 1947. 290 pages, 4 figures, 2 maps. Price $4.

The half-brig *Daisy* was a New Bedford whaler going south in 1912 for the oil of sperm whales in the Atlantic and of sea elephants on the island of South Georgia. The skipper was from Martha's Vineyard, and most of the crew of more than thirty men were from the West India or Cape Verde islets. The whole crew had this in common—they were all islanders, "which is in keeping with the whaling tradition because boatmen are more important than mere sailors."

Murphy, too, was an islander, from Long Island, New York. He shipped as assistant navigator, a berth usually reserved for the skipper's wife, but his duties were those of museum naturalist. His interest was in the animals of the sea. For the American Museum of Natural History he skinned birds, pickled squids and cleaned skeletons, and made as complete collections and studies of the life of the sea and the islands visited as one man could do.

Dr. Murphy is now chairman of the Department of Birds of the American Museum and the outstanding authority on oceanic birds. His major work is a classic, the two-volume *Oceanic Birds of South America* (1936). But when this story opens he's recently out of Brown University, recently married to the "Grace" of the title, and about to start on an eleven-month voyage in the *Daisy*.

The tale is from his diary, his logbook, written daily to tell his wife what he saw and felt, to help bridge the gap in time and space, and to assuage his nostalgia. It's a human story, of pride and pleasure in accomplishment, of the drag of empty days in the doldrums, of the life of a free-running ship, and of the quick passage of crowded days.

It's a human story of the weather, rainbows, and storms; of the Atlantic as flat as a silver disk and with great waves running; of ice fields and green tussocks and beaches of South Georgia; of whales and whaling and sealing, and how the whales spout and what the seals feed on; of albatross and skua, and the petrels that swarm in the far south, and the penguins that always run from the sea when danger threatens; of the Portuguese man-o'-war, of a glimpse of the convict settlement of Fernando Noronho, and of incipient scurvy; of the daily life on a whaler and of comments on Shakespeare and Dante and Bunyan; and of the author's anxiety to finish his job and be home with his loved one.

It's an intimate story, combining travel and observation with a love story and much good writing. It's a book to be read and cherished.

AUSTIN L. RAND
Curator of Birds

Geology Expedition in East

Dr. Sharat K. Roy, Chief Curator of Geology, and Mr. Harry E. Changnon, Assistant Curator of Geology, began an expedition by automobile in various eastern states last month to collect representative ores, physical geology specimens, and certain types of rocks required for the Museum collections. A special effort will be made by the Eastern States Geological Expedition to obtain specimens of ores with characteristic features from which the mode of origin of the ores may be interpreted. Many of these specimens will be used in the Economic Geology Hall, where exhibits are now being installed; others will be added to the geology study collections. Much of the time will be spent in the Adirondack region and its mines, an excellent area in which to obtain certain types of ores as well as physical geology specimens that display effects of the forces involved in mountain building and rock metamorphism.

SCREEN LECTURES ADDED TO TOUR SCHEDULES

Beginning with the program (below) for September, a new feature has been added to the guide-lecture tours that are presented daily except Sunday. The Friday lecture tours, which are on special subjects, henceforth will open with an introductory lecture in the new meeting room on the second floor of the Museum. Here the guide-lecturers will give a preliminary talk usually illustrated with lantern slides, and in some cases with motion picture films and with specimens of material that can be inspected at close range or handled by the audience.

The tours will continue to be conducted at 2 o'clock in the afternoon. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays. A schedule of these follows:

Wed., Sept. 3—School Bells Ring Again (*June Buchwald*).

Fri., Sept. 5—Story of Mountains. Illustrated introduction in Meeting Room (*Winona Cosner*).

Wed., Sept. 10—Smokes and Smokers—Tobacco and Its Uses (*Marie Svoboda*).

Fri., Sept. 12—Amoeba to Ape. Illustrated introduction in Meeting Room (*Lorain Farmer*).

Wed., Sept. 17—Story of Gem Stones (*Winona Cosner*).

Fri., Sept. 19—Fibers, Feathers, and Furs—Materials Used in Clothing. Illustrated introduction in Meeting Room (*Marie Svoboda*).

Wed., Sept. 24—Animals of Legend and Fable (*Lorain Farmer*).

Fri., Sept. 26—Indian America (Indian Day). Illustrated introduction in Meeting Room (*June Buchwald*).

There will be no lecture tour on September 1, because of the Labor Day holiday, but the Museum will be open to visitors from 9 A.M. to 6 P.M.

Technical Publications Issued

The following technical publications were recently issued by Chicago Natural History Museum:

Fieldiana—Zoology, Vol. 32, No. 2. *Catalogue of North American Beetles of the Family Cleridae.* By Albert B. Wolcott. June 12, 1947. 48 pages. $0.75.

Fieldiana—Zoology, Vol. 32, No. 3. *Catalogue of Type Specimens of Fishes in Chicago Natural History Museum.* By Marion Grey. June 27, 1947. 100 pages, 24 text figures. $1.25.

Fieldiana: Zoology, Vol. 31, No. 18. *Two New Beetles from Costa Rica and Australia, with a description of a New Genus (Coleoptera, Cleridae).* By Albert B. Wolcott and Henry S. Dybas. July 31, 1947. 6 pages, 3 text figures.

ANCIENT 'DPs'

(*Continued from page 1*)

says Dr. Martin. But almost as important as the actual discovery was the dating of the site. How long ago had these implements been left by the side of the ancient stream?

In hope of a solution to this problem, Dr. Martin called on Dr. Ernst Antevs, of Globe, Arizona, a student of the Ice Age and of the climates of the past, formerly of the Harvard faculty and the Carnegie Institution, Washington, D.C. Dr. Antevs came at once, for not only an interesting geological problem was at hand—here was a claim that the Cochise Indians had ventured far north into the mountainous regions of western New Mexico. Mr. Sayles and Dr. Antevs had worked many years in Arizona trying to unravel the history of these ancient Indians in that state.

The information gleaned by Dr. Antevs from the arroyo walls wove a fascinating story. The erosion and the gravel beds correspond to those in other regions of the Southwest and indicated an extremely dry period lasting from 8,000 to 4,000 years ago.

"The country was a lot drier then than it is now," says Dr. Antevs, "and now there is only fourteen inches of rainfall per year—if the rain-gods are merciful. During this ancient drought little vegetation could survive; the rain, when it did fall, ran off rapidly over the hard, bare ground, leaving it scarred with erosion channels. Soils and silts were washed away and the stream bed became paved with gravel and boulders."

DRIVEN BY DROUGHT

Dr. Antevs, Dr. Martin, Mr. Sayles, and Dr. Rinaldo all agree that it was because of drought and need of water that these prehistoric Indians strayed into the mountains of New Mexico. It was the drought that drove them up Wet Leggett Canyon to the small, permanent spring that flowed there. But the erosion that uncovered the stone tools of these Indians to the archaeological eye was begun by cattle-grazing in the period around 1870 or 1880, thus reproducing the conditions that existed several thousand years ago.

Now with geological and archaeological evidence the antiquity of these stone tools is virtually assured. The total lack of pottery, the apparent absence of houses, the crudity of the tools, and the geological occurrence indicate the great age of the material. But, further, the grinding stones, the choppers, the scrapers, and the arrowheads enable the archaeologist to appraise with reasonable certainty the type of life these ancient Indians led.

It was a life of hunting, seed gathering, and constant moving in search of game and water. The habitable regions were restricted to the vicinity of springs and flowing streams. Most tools were left at the camping sites, one of which has now been found at Wet Leggett spring. Possessions were few and life was hard and insecure.

Had it not been for the devastating erosion and the persistency of the archaeologist's search for early man in the New World, the evidence of the Cochise Indians might have remained an unknown chapter of American Indian history.

3rd CHICAGO INTERNATIONAL NATURE PHOTO SHOW

The Museum will again co-operate with the Nature Camera Club of Chicago in presenting early in 1948 the Chicago International Exhibition of Nature Photography, the third in this series of salons. The exhibition will be held in the Museum from February 1 to 28, inclusive. Entries may now be submitted, in care of the Museum. Final deadline for entries is January 17. The judging will take place on January 24 and 25.

The exhibition will have two divisions, prints and color transparencies, with a fee of $1 in each, to be sent with the entry form and pictures. Contestants are limited to a maximum of four prints (either black-and-white or color) and four color transparencies. Forms will be available on application in September (foreign contributors need no entry form and pay no fee, due to foreign exchange difficulties). The forms may be obtained from the Museum or from the chairman of the exhibit, Mr. H. J. Johnson, 1614 Adams Street, Chicago 12.

The judges will be: Mr. L. H. Longwell, Associate of the Photographic Society of America; Mr. John R. Millar, Deputy Director of the Museum; Mr. Karl Plath, artist and Curator of Birds at Brookfield Zoo; Mr. Lee Smiley, a high school teacher of biology and photography, and Dr. Theodor Just, Chief Curator of Botany at the Museum.

As usual, the subject matter of entries will be restricted to nature, but some changes have been made in classifications. The "Scenery" classification has been changed to "General" to make better provision for the inclusion of all classes of nature photographs that will not fit into the two primary classifications of "Plant Life" and "Animal Life." The General classification will thus include scenery, geological formations, frost forms, anthropological subjects (including archaeological sites), and miscellaneous manifestations of nature.

Color transparencies, instead of being grouped together as hitherto, regardless of subject, will be divided into the same classifications as prints: Plant Life, Animal Life, and General.

Attention of readers of the Museum BULLETIN is called to the fact that entries are welcome from anyone who uses a camera. It is not necessary to be a member either of the Nature Camera Club of Chicago or of any camera club with which it is affiliated.

MICRONESIA

(*Continued from page 2*)

circle of relatives. Considerations of kinship also affect other aspects of life, from birthday parties to the selection of village officials, such as the magistrate.

Finally, the Marshallese have adopted Christianity, in the form brought by nineteenth-century missionaries, and modern medical practices, and are taking rapidly to the American type of school. Yet though the Marshallese have incorporated the Western institutions of church, hospital, and school into their lives, they have not abandoned a strong belief that the ghosts of the dead cause disease or that an effective system of education is found in the voluntary association of children of similar age who learn many of the necessary skills, manners, morals, and traditions through a highly informal, imitative process of absorption from their elders and relatives.

CO-ORDINATED INVESTIGATION

The Museum expedition to the Marshall Islands is part of a larger program for the study of Micronesian peoples. This program, called the Co-ordinated Investigation of Micronesian Anthropology, is sponsored by the Pacific Science Board of the National Research Council, and has been undertaken to meet the pressing need for anthropological information on the native peoples of Micronesia.

Major scientific institutions engaged in anthropological research are participating and are sending anthropologists into the field. The work has been greatly facilitated by the assistance and co-operation of the Navy Department. The Museum's expedition is the first to return from the field under this program.

NEW MEMBERS

The following persons became Members of the Museum during the period from July 16 to August 15:

Associate Members

Robert A. Carr, John Caleb Cushing, Marshall G. Sampsell, Mrs. Elmer J. Schafer.

Annual Members

Henry C. Bonfig, Charles W. Bracken, Mrs. Jane Marian Bradford, Mrs. Orville T. Bright, Richard R. Chapman, David B. Cheskin, Fairfax M. Cone, Samuel G. Creden, Dr. William L. Culpepper, Walter F. Dodd, W. Fred Dolke, Dr. James R. Downing, George F. Endicott, Joseph G. Fuhry, Edward H. Hanses, Mrs. Edith Sackett Howard, R. W. Johnson, Harry E. Kellogg, Charles Kratsch, Paul Levy, Eli Metcoff, Miss Mary Jeanette Prietsch, Burke B. Roche, Ralph H. Ross, Thomas P. Scanlan, Mrs. Herbert S. Schelly, Joseph Herbert Smith, Robert C. Smith, William Knowlton Traynor, Philip W. Vineyard, Mrs. Philip H. Wain, George H. Wallace, Albert W. Williams, H. Fred Wilson.

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BEAR HUNT IN MEXICO—STORY OF MUSEUM'S GRIZZLY GROUP

By C. M. BARBER

The Mexican grizzly, said to be the smallest of the grizzlies, was named *Ursus nelsoni* by Dr. C. Hart Merriam in honor of E. W. Nelson. The type specimens were taken near Colonia Garcia, in the Mexican state of Chihuahua, by Hyrum A. Cluff in 1899, and additional specimens were collected by E. W. Nelson and E. A. Goldman. The southern form, while not habitually looking for trouble like the northern ones described by Lewis and Clark in 1805, would really fight on the proper provocation.

At Colonia Garcia [in 1901] I joined forces with Cluff, a renowned bear hunter. He had a partner whom I now can only recall as Will. Between us we had seventeen small bear traps and a few No. 4 traps for wolves. Since our horses were to be ridden on grass, without grain feed, each man had two saddle horses so that one could rest each day. We headed south the next morning for Wild Horse Mesa.

SONORAN GRIZZLY BEAR GROUP

The story of the adventures surrounding collection of the specimens is recalled by Mr. Barber, one of the hunters, in the accompanying article. The group, in Hall 16, was prepared by Staff Taxidermist Julius Friesser, and the background is by the late Charles A. Corwin, for many years Museum Staff Artist.

It was cool, though the sun was shining brightly from a clear sky. The summer rains were over. Most of the game had left the higher ridges to move into the rougher country on the slopes of the main range. The plateau proved to be covered with a magnificent stand of virgin pine. Here and there in this forest was a live oak, a red-barked madrona, or a manzanita, that gave some added color to the scene. There was almost no underbrush. The forest floor was grass and flower covered. You could see any game a hundred yards away through the trees.

Large flocks of noisy, big, green parrots laughed at us from the treetops. The giant woodpecker, the largest in the world, related closely to our ivory-billed woodpecker, resented our intrusion and flew away with loud, hoarse cries. A few sleepy, green trogons flew from bough to bough. The trogons and parrots in this temperate scene showed how close we were to a much hotter country a few miles west and down the slope.

At Wild Horse Mesa we left the main plateau, dropped over the eastern rim and down into a rough country of narrow timbered ridges, their steep sides covered thickly with oak brush. The canyons were deep and rocky, each with a swift, clear stream of cool water. Here we located our permanent camp. Two tents were set up, although we expected no rain or snow. A brush shelter for cooking and eating was built.

We now went out to find locations for trap sets. These were so selected as to give us two circuits to ride daily. The traps were spaced a mile or two apart, each set near a good game trail. Some were placed in low saddles in the hills, others in stream bottoms. Since deer were plentiful we killed one for each large trap, taking the hind quarters to camp for our meat supply. The front end of each deer plus all entrails became the trap bait. Once we baited a trap with a big turkey gobbler—gobblers are too difficult to cook well in camp.

A pen was built of small logs from the plentiful supply on the ground. Located against the base of a standing tree, this pen was laid up log on log like a rail fence corner. A few short chunks of log partly closed the open side of this triangle, leaving a narrow clear path to the bait. At the front of the enclosure the trap was placed in a hole dug out so that the trap pan was level with the ground surface, then lightly covered with earth and finally with leaves or pine needles. The trap springs were put down and held by large thumb screws while the trap was being set. Each trap had about three feet of strong chain and a large ring.

A sturdy green oak sapling twelve to eighteen feet long was now cut for a drag. After being carefully trimmed of all branches this pole was driven through the chain ring within a foot or so of the large end. This formed the drag that kept the trapped bear from traveling too far. Just to the rear and front of the trap small dead sticks were placed. Since a bear prefers to walk on solid ground, these sticks directed his foot into the trap. As a rule, bears are not difficult to trap and most of them are caught by the front foot. When the trap is sprung the bear makes a big jump, and runs off, taking trap and drag along at a rapid clip,

From the manuscript, "Recollections of a Museum Collector," by former staff member C. M. Barber, these notes present the story behind the Museum's habitat group of the Sonoran Grizzly Bear (Hall 16), for which Mr. Barber collected the specimens some time before he joined the Museum staff. Mr. Barber's account gives an extraordinary impression of the wealth of game animals in the mountains of northwestern Mexico at the beginning of the 20th century.—K.P.S.

knocking rocks and down logs out of the way. This drag makes a plain trail to follow; brush catching on the drag soon slows the bear to a walk. When he reaches rough country he crawls into dense brush, digs out a big hole and crawls in to rest and cool off.

Some of the Mormons intimated that Hyrum Cluff was not a proper Latter Day Saint; but as a bear hunter he was really good! He was a small man, but very strong and quick. He was a splendid horseman. On foot, this man seemed tireless. His courage and judgment were correctly mixed for every emergency. He used a 30–30 Winchester, with which he was a dead shot.

DOG PLAYS IMPORTANT ROLE

Cluff owned a big, rough-looking dog called Shep. He maintained that this dog was half hound and half shepherd. Shep was an excellent varmint dog, ranging far and wide. At a word from Cluff he became a slow-trail dog that would not leave your sight. On the trail of a trapped bear Shep was a great comfort as he walked slowly along ahead of you, trailing and sniffing the air for that bear. While he took no chances with bear or mountain lion, Shep had no real fear of either. Cluff knew the dog had saved his life on several occasions. He valued him and protected him.

Once the traps were all set, we started our routine. Two men riding and hunting together would run the north trap line. The other man with Shep for protection made the south run.

We caught a couple of mountain lions, and then Hyrum and Will got the first grizzly. The day was bad, baits stolen by lions, traps sprung by skunks, all of which made a lot of extra work. More bait had to be killed, traps reset. The last bear trap on the north line was out in fairly open country. It was about an hour before sundown when they found the trap gone. Leaving their horses and with rifles ready, they followed a plain drag trail, one trailing, the other looking over every foot of cover in front and on each side to avoid surprise. They knew at once, by his tracks, that a large bear had been caught. They also knew he would be an angry bear, watching his back track and hoping for a fight.

GIANT GRIZZLY CHARGES

After tracking a mile, night was approaching; so they had to hurry. The country was rougher now, with large patches of oak brush, so thick you could hardly see into them. Hyrum was trailing, hurrying, but trying to be careful. Will was doing his best to look over everything in sight. Suddenly, out of a brush patch they had passed, a gigantic grizzly charged down on them. Even with trap and drag he was making speed. Both men whirled and fired, almost together. Down went the bear. The shots were deadly, both of them. The bear thrashed around for a time, but could not get up. He had been too close for comfort, yet close enough for good shooting, even in that failing light. The weather was cool; so they left him where he fell.

At the break of day we were back there at work skinning a magnificent specimen. He seemed to be a full-grown and large bear. On a later hunt we saw the crooked track of a still larger bear's foot, apparently that of a much larger grizzly. This latter bear became known to us as "crooked-foot." He looked our trapsets over, but at a safe distance. Apparently, he had at some time been caught in a trap and was too wise to try again. The pelt of our big male specimen was like most of these Mexican grizzlies in fall pelage, almost black with not many silver-tipped hairs. His coat was heavy and in fine condition.

A few days later, Shep and I made the north trap line with only a half-grown lion for our trouble. That night, Cluff and Will came in with the handsome pelt of an old she-bear. She was really a true silver-tip for color. Her teeth were much worn, showing age. She had not traveled far with the drag. She was rather small and killing her had been easy.

MOUNTAIN LION TRAPPED

Will sometimes stayed in camp to clean up the hides and skulls on hand. Hyrum, Shep, and I then made the rounds. One such occasion was my lucky day. At the second trap we found a big male lion, a handsome brute. As usual he was caught by the hind foot. These big cats were *almost* too smart to be caught. They always walked on the logs and sticks we placed about our traps, but when they finally got their teeth into the bait they dropped a hind foot into the trap.

We ate our lunch of cold meat and biscuits as we rode along. The next trap was missing, and since nothing was in sight, we knew we had a bear. Leaving our horses, we put Shep on the trail and were soon in rough country. We followed up a smooth draw for a half mile. Directly ahead was a steep brush-covered mountain. Shep kept raising his head, trying to wind the bear. As we reached the foot of the mountain the dog whined, then barked and rushed into a thicket. About twenty feet away and ten feet above us a handsome young female bear raised up out of a hole. It was agreed that this was to be my bear, as I had never killed a grizzly. I raised my gun to shoot. Cluff said, "Don't shoot from there—the bear could jump down on you."

While Shep kept the bear busy, I crawled around through the brush to get above the animal. When I was well above her I aimed for the heart. As I fired, the bear made a lunge at the dog. The bullet broke her spine, and a heart shot finished her.

Shep and I missed the really big show a few days later. Hyrum and Will took a burro and pack saddle out on the north trap line to change some trapsets that seemed to be doing us no good. They had two bear traps on the burro as they approached another trap, set in a shallow draw. The jogging burro carrying the traps made a loud jingling noise as it went along. When they topped the draw, a grizzly ran out on the far side and away at full speed. Cluff dropped from his horse, grabbing his rifle from its scabbard as he went. His first shot knocked the bear down but it was up and on the way at once.

A RUNNING BATTLE

Cluff tried several more running shots with no apparent result. As the bear went down, Will spurred his horse across the draw and gave chase. They were running down a gently sloping ridge. As he began to catch up with the bear, Will pulled his rifle, thinking to try a running shot from the saddle. Before he could start shooting, the bear turned and charged right at him. His horse dodged the charge, then made a run to leave, the bear following close behind at every jump. Will was too busy riding and dodging limbs and brush to risk a shot.

In the meantime, Cluff had mounted his horse to hurry into the battle. He intercepted the charge, again dismounting for better shooting. His next shot again knocked the bear down. When Cluff tried to flip a shell into his rifle barrel he discovered his magazine was empty. The bear was now charging him. He had just time for a jump and swing that took him over a limb to safety, as the bear arrived below. Seeing that he was no longer being chased, Will dismounted some distance away. He had a good shot at the bear swinging at Cluff under his tree. A heart shot finally did the business. Will remounted to round up Cluff's frightened horse and the burro.

The boys now skinned their prize. They found eleven bullet holes in the hide, good shooting, everything considered. Most of the shots were near vital organs. It is remarkable how much lead a thoroughly aroused grizzly can carry and still fight. This animal was a young but matured male in fine condition. He was caught by one toe in the trap. This must have been very painful to him. It held him all night, until he heard the clanking traps and human voices approaching, when he tore off the toe to make a run for it.

The battle that followed did not last very long, but every one concerned was really busy while it went on. I had a good supper ready for the boys when they reached camp. They seemed rather quiet as they dismounted. When I untied that hide from the saddle, spread it out hair side down, and counted the bullet holes, I began to realize they had had a real adventure.

(To be continued next month.)

SPONGES THAT WORK FOR A LIVING: THE TARANTULA, TOADSTOOL, AND TULIP

By EUGENE S. RICHARDSON, JR.
CURATOR OF INVERTEBRATE FOSSILS

In almost every animal group there are individuals who make their living by "sponging" on others. Cowbirds lay their eggs in another bird's nest; jackals tag along to benefit from the kills of bolder animals; hermit crabs neither build nor pay rent; and, most conspicuously, not a few human beings are not above cadging sodas, accepting unintended invitations to dinner, or "borrowing" books for an indeterminate

TARANTULA-LIKE SPONGE
Brachiospongia digitata, an Ordovician species. Illustration about half natural size.

period. To call these characters with the carefree habits "sponges" may assuage our irritation, but it is an unwarrantable slur against one of the gentlest and most hard-working animals that has ever lived.

Not a single parasitic sponge is known, though a great many fasten themselves to shells of crabs or other moving animals, and one, *Cliona*, burrows into oyster shells to protect itself. Most sponges just settle down on the bottom of the sea, in not-very-deep water, and stick to their business of catching microscopic food. Two very handsome yellow sponges in the marine group from the Maine Coast in Hall O (Fishes) suggest the ornamental quality of this odd animal.

Because of their bright colors and their shapes, these animals, which are attached to the sea-floor, were long supposed to be plants. That they are really animals was shown in 1765 by an English investigator, Ellis, who discovered currents of water issuing from the openings (*oscula*) on the top of some small sponges. He reported that the oscula "receive and pass the water to and fro," in which he was mistaken: a steady and strong current of water passes *out* of the osculum, but never *in*.

How, then, does the sponge get all this water which he is continually sending out of his only apparent opening? Look very closely at a sponge; the body is actually a porous wall surrounding a central cavity that opens through the osculum. If you put some powdered chalk on the surface of a living sponge, you will see it sucked into the almost invisible pores and then squirted out with the outgoing current. This experiment was first done in 1825 by Grant, another Englishman, who thus demonstrated the feeding habits of sponges.

OUTDOES CAT'S 'NINE LIVES'!

With a microscope, you can see that the sponge body is made up of eight kinds of cells, rather loosely joined together, each almost an independent animal. If you cut the sponge apart, the pieces continue living. Indeed, there is no visible effect on the sponge, even in the near vicinity of the cut—apparently it has nothing like a nervous system. The independence of the cells of this peculiar animal is strikingly shown by squeezing a live sponge through the mesh of a fine sieve, which reduces it to tiny fragments of tissue. These, after a calamity that would ruin any more highly organized animal, continue to live and will reproduce several entire sponges.

The vitality of the individual cells suggests that the sponges may not be far removed from a colony of Protozoa. Protozoan colonies are small masses of a jelly-like material, not more than one-tenth of an inch in diameter, with many individual one-celled animals on their surface. Each of these is independent of the rest, but they always live in colonies and have taken a step toward a higher life-type in that some of the members are structurally and functionally specialized.

Sponges are among the oldest forms of life on earth, though the fossil record of their earliest evolution is unknown. A comparison with some of the colonial protozoans, whose members are nearly the same in appearance as the feeding-cells of the sponge, strongly suggests that at some time in the dawn of Earth's history a highly developed colony of Protozoa produced new cell types by specialization of some of its members, or else brought other kinds of Protozoa into its association and became the first sponge.

As the general plan was more and more perfected, the "pre-sponge" acquired the several kinds of cell now used by its descendants: the collared cells with little whips, for feeding and for making the water currents (and so remarkably similar to some of the colonial protozoans); the amoeboid cells for taking nourishment from these and carrying it to the non-feeding cells of the body; the doughnut-like cells forming the pores of the body-wall; and the special cells to take mineral salts from the water and form them into stiff, bristly, little mineral needles, or spicules, which strengthen the sponge and make it unpalatable to most potential enemies. It was a slow process, this evolution by trial and error, and in the intermediate stages, before all the necessary types of cell were added or derived, the animal's efficiency in feeding was slight. It could have happened only in pre-Cambrian times, when minute animals and plants were abundant and competition for them slight.

THE 'SPONGING' IS ON THE SPONGE

The sponge is one of the most efficient food-gatherers now living, with a ceaseless current bringing water in through the tiny pores, where the collared cells catch the tiny animals and plants in it and then sweep it on through the sponge. The next time that you want to call someone a sponge, think of a big sponge found a few years ago in Tortugas, healthy and growing, though 16,352 shrimps and thousands of lesser animals had installed themselves within it to take advantage of the food-bearing water so energetically swept past them by their uncomplaining host, who provided them shelter as well.

With almost unlimited time for experimenting, sponges have developed many different sizes and shapes. A complete knowledge of their forms during geologic time will never be had, as a fossil sponge is rather rare. Upon death, sponges usually disintegrate rapidly, leaving only some spicules to be swept up by currents and scattered over the sea-floor. An unusually fine collection of fossil sponges is displayed in Frederick J. V. Skiff Hall (Hall 37), especially in the Ordovician, Silurian, and Cretaceous cases. The specimens illustrated here happen to have shapes suggestive of other forms of life—a tarantula, a toadstool, and a tulip. It is a matter of some trouble to sponge specialists to account for the fact that such loosely organized animals can

TULIP-LIKE SPONGE
Siphonia tulipa, of the Cretaceous. Illustration about natural size.

develop a shape characteristic of each species and stick to it. A great deal remains to be learned of their make-up, and the fossil sponges are as important to the problem as are the living ones.

Chinese ivory carvings of the 18th and 19th centuries and snuff bottles carved from semiprecious stones are exhibited in Case 12 of Stanley Field Hall.

TRAVEL AND NATURE LECTURES ON SATURDAY AFTERNOONS, OCT. 4—NOV. 29

The autumn course of nine free illustrated lectures on Saturday afternoons will open October 4 in the James Simpson Theatre of the Museum. The lectures will continue each Saturday through the last week of November. All lectures will begin at 2:30 P.M. They are restricted to adults—special programs for children will be given on Saturday mornings during the same months under the auspices of the James Nelson and Anna Louise Raymond Foundation.

The lectures will be given by outstanding speakers and will cover a wide range of subjects including prehistoric life, animal hunting, the life relations of plants, and exploring in Hudson Bay, the Southwest, Australia, and the Antarctic.

The dates, subjects, and lecturers booked for the autumn course are as follows:

October 4—"OUTLAWS" IN NATURE

Murl Deusing

The exciting story of the hawk and the owl, the rattlesnake and the black widow spider, the hornet and the water tiger—creatures that frequently find themselves "outside the law" from a human point of view. There is rollicking fun with a cub black bear who goes on a series of adventures. Mr. Deusing is a member of the staff of the Milwaukee Public Museum.

October 11—JUNGLE ADVENTURES

Frank Buck

Known as Frank "Bring 'Em Back Alive" Buck, this famous wild-animal collector, adventurer, and explorer has a story to tell of daring safaris into exotic places. He brings his audience face to face with adventure in stories and motion pictures of his experiences. Mr. Buck knows intimately the jungles of southern Asia, India, the Malay Peninsula, Burma, Sumatra, Java, Nepal, Borneo, New Guinea, the Sulu Islands, and the Philippines as well as the African and South American jungles.

October 18—THE LAND DOWN UNDER

Carl von Hoffman

This lecture covers such diverse facets of Australian life as the tribal customs of the continent's primitive peoples; a trip through the desert on camels; strange animals—the koala bear, kangaroo, wombat, platypus, the kookaburra and lyre birds; 300-foot-high eucalyptus trees; the Great Barrier Reef, 1,200 miles of coral, unrivaled for the variety and beauty of its marine life; diving for pearls; and natives spearing crocodiles. Mr. von Hoffman has appeared many times on the Museum's lecture platform.

October 25—EXPLORING FOR DINOSAURS

Dr. A. S. Coggeshall

Dr. Coggeshall, who has been a member of the paleontology staffs of several important museums and now is director of the Santa Barbara, California, Museum of Natural History, takes his audience to the "very morning of time" when huge dinosaurs inhabited vast swamps and dense jungles where great mountains now stand. In his motion pictures he shows the hunt for and excavation of the skeletons of these great prehistoric monsters of 100 to 200 million years ago. He also shows films in which they are restored to their appearance in life.

November 1—ANTARCTIC ADVENTURE

Carl Eklund

When the last United States Antarctic Expedition, led by Admiral Richard Byrd, set sail for the frozen reaches of the Antarctic, Carl Eklund went along as official biologist and ornithologist of the expedition. After having touched at Little America, the expedition sailed on to East Base some 1,500 miles away, and it was from there that Carl Eklund set out with one companion and two dog sleds on his trip of exploration. Mr. Eklund and his companion traveled 1,200 miles across the freezing wastes, sometimes through howling blizzards that reached 115 miles per hour in intensity. But he found what he had set out to get—a complete record of the wild life that clings to existence at the bottom of the world.

November 8—ARCHAEOLOGISTS IN ACTION

Dr. Paul S. Martin

For fourteen seasons Dr. Martin, Chief Curator of Anthropology at this Museum, has carried on excavations of prehistoric sites in the Southwest, studied the artifacts yielded by this activity, and published the results of his findings which have added many new chapters to the knowledge of some of the earliest American Indians. His present lecture, including the narrative of his latest expedition conducted during the past summer, brings the record up to date. The lecture will be accompanied by colored motion pictures made in the field by Mr. John W. Moyer, chief of the Museum's new Division of Motion Pictures, who was assigned as special cinematographer to the expedition.

November 15—HUDSON BAY ADVENTURES

C. J. Albrecht

Mr. Albrecht, formerly a staff taxidermist at this Museum, brings to his audience an intimate and dramatic color record of the

Photograph of mural by Charles R. Knight—Copyright Chicago Natural History Museum

THE STORY OF CREATURES SUCH AS THIS BRONTOSAURUS WILL BE TOLD IN THE OCTOBER 25 LECTURE, "EXPLORING FOR DINOSAURS," BY DR. A. S. COGGESHALL.

RESERVED SEATS FOR MEMBERS

No tickets are necessary for admission to these lectures. A section of the Theatre is reserved for Members of the Museum, each of whom is entitled to two reserved seats. Requests for these seats should be made in advance by telephone (WABash 9410) or in writing, and seats will be held in the Member's name until 2:30 o'clock on the lecture day.

great caribou migration. He traveled 300 miles with the bounding bulls of the tundra. There he learned their habits and filmed the intimate life of the otter, beaver, mink, ermine, and birds. This is a new color picture, just completed, of sub-Arctic adventure.

November 22—THE NATURAL HISTORY OF MOSSES

Dr. William C. Steere

Dr. Steere, one of America's foremost bryologists, has spent most of his student and professional life at the University of Michigan, where he is now professor of botany and chairman of the department of botany. During World War II, Prof. Steere served with the Board of Economic Warfare and the Foreign Economic Administration as a senior botanist. From 1942 to 1944 he accompanied the government's Cinchona Missions in Colombia and Ecuador, searching for sources of quinine to replace those taken by the Japanese in the South Pacific.

November 29—RAMS OF THE RIMROCKS

Cleveland P. Grant

Mr. Grant's lecture is accompanied by a color film on one of the most spectacular and majestic of all big game animals, the North American bighorn mountain sheep, photographed against its native Rocky Mountains. It is the story of bighorn sheep at their most critical and interesting times of year—spring lambing and fall mating and fighting. To see these 250-pound rams charge together until their horns hit with the crack of a rifle is one of the thrilling sights of the American wild. Mr. Grant formerly was a member of the staff of this Museum.

Paleontology Field Trip to Western Colorado

The Paleontological Expedition to Western Colorado returned from the field on August 31 with collections from Paleocene and Eocene deposits. Included were specimens of Pantodonts, large, heavy, clumsy mammals, primitive four-toed horses, early carnivores, small primates and various lizards, turtles, and crocodiles. The expedition was one of a series initiated before the war and was intended as a final survey of an area in which the Museum has long been interested. With the completion of the collecting program, the study of the material obtained can now be carried to completion. Mr. Bryan Patterson, Curator of Paleontology, was leader. He was accompanied by Mr. James H. Quinn, Chief Preparator in Paleontology, and Mr. Richard Bisbee, Chicago, who was with the expedition as a volunteer to make a motion picture record in color of scenes and activities that may be incorporated later into a film on paleontological exploration and research by Chicago Natural History Museum.

STAFF NOTES

Captain Harry Hoogstraal and **Mr. Floyd G. Werner** returned to the United States recently after completion of the Philippines Zoological Expedition, 1946–47. Upon their return both were temporarily appointed to the staff of the Division of Insects. Captain Hoogstraal, who directed the expedition, will remain with the Museum until February of next year; Mr. Werner is resuming his graduate studies at Harvard University this fall. . . . **Dr. Rainer Zangerl**, Curator of Fossil Reptiles, flew to Europe recently on leave of absence. In addition to visiting his home in Switzerland, he is collecting specimens and conducting research for the Museum in fossil fields and museums of Switzerland, France, Italy, and the American occupation zone of Germany. He will return here about November 1. . . . **Miss Harriet Smith** has been appointed a lecturer on the staff of the Raymond Foundation, replacing **Miss Roberta Caldwell** who resigned to engage in post-graduate university studies. Miss Smith is a graduate of Northwestern University and obtained a master's degree in anthropology at the University of Chicago. She formerly was in charge of extension work at the Illinois State Museum, Springfield, later was assistant to the director of the Chicago Academy of Sciences, and more recently was connected with the motion picture staff of *Coronet* Magazine. . . . **Dr. Wilfrid D. Hambly**, Curator of African Ethnology, is the author of *Jamba* (the Elephant), a popular book on the tribal life of the Ovimbundu in Portuguese West Africa, about to be published by Pellegrini and Cudahy. The book results largely from Dr. Hambly's observations while leader of the Frederick H. Rawson West African Expedition of the Museum and is for adults.

The various species of birds that have become extinct on the North American continent in historic times are grouped together in Hall 21.

SATURDAY MOVIES FOR CHILDREN

The James Nelson and Anna Louise Raymond Foundation will open its autumn series of free Saturday-morning programs for children on October 4, continuing through November 29. The programs begin at 10:30 A.M. in the James Simpson Theatre of the Museum. On three of the programs, as a special feature, lecturers will appear to tell the children the story of their films. Personal appearances will be made by Frank "Bring 'em Back Alive" Buck, Murl Deusing of the Milwaukee Public Museum, and Anauta, a native of Baffin Island.

Children may come alone, accompanied by adults, or in groups from schools, etc.

Following is an outline of the programs:

October 4—BRIGHT FEATHERS

The Murl Deusing family in search of adventure (lecture by Mr. Deusing)

October 11—JUNGLE ADVENTURES

(Lecture by Frank "Bring-'em-Back-Alive" Buck)

October 18—INDIANS OF AMERICA

Also a cartoon

October 25—WINGS OVER ALASKA

Also a cartoon

November 1—STORY OF THE SEASHORE

Also a cartoon

November 8—CAVALCADE OF MARBLE

Also a cartoon

November 15—MY FRIEND FLICKA

(*Repeated by request*)

November 22—EAST OF BOMBAY

Also a cartoon

November 29—STORY OF BAFFIN ISLAND AND ITS PEOPLE

Told by Anauta, a native of Baffin Island

Bermuda Expedition Reports Progress

Dr. Fritz Haas, Curator of Lower Invertebrates, reports a successful stay at the Bermuda Biological Station for Research, at St. Georges West, Bermuda, where he and Mr. Joseph B. Krstolich are engaged in studies on the life of the coral reef. Mr. Krstolich required first-hand studies of translucence and color of living marine forms for the Museum's program of exhibition in this field. The Bermuda reefs, with the facilities of the Research Station, are an especially favorable site for Dr. Haas' long-continued interest in the ecology of mollusks. Dr. Dugald E. S. Browne, the director of the station, has taken keen interest in the work of the Museum party and has given its members all possible aid.

Chicago Natural History Museum

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Members are requested to inform the Museum promptly of changes of address.

THE ANCIENT MOGOLLONS' HOUSING TROUBLES

"Housing—heap big headache!"

Dr. Paul S. Martin, Chief Curator of Anthropology and Leader of the Archaeological Expedition to the Southwest, is pretty sure that the Mogollon Indians of 1,500 years ago did not use these exact words, but it's a good bet that they grunted out something to that effect and probably cursed the gods for bringing them to the mountains of what is now Catron County, New Mexico.

"Although facing a severe housing problem in present-day society, we cannot envy yesterday's Indians, for in many ways they faced a far more serious crisis," says Dr. Martin.

After excavating five pit-houses (circular ground pits, approximately four feet deep and nine to forty-five feet in diameter) at Promontory site, nine miles southwest of Reserve, New Mexico, Dr. Martin and his staff found themselves confronted with a number of questions.

In climbing the ridge to Promontory, 7,000 feet above sea level, the question naturally came to the breathless archaeologists: "Why in blazes did the Mogollon Indians ever decide to live on such a high, inaccessible mountain?" For they knew that the Indians would have to climb up and down, walking miles to obtain water.

Warfare and defense immediately were suggested, but as yet no evidence of warfare has been uncovered. In digging their homes on Promontory site the Mogollon Indians needed large quantities of water with which to make adobe, a clay plaster, which on top of branches and poles roofed their ancient pit-houses.

"Mamma, papa, and all the papooses had to haul water during those days and probably drank most of it before they reached the top of Promontory," says Dr. Martin.

Dr. Martin, supervising a crew of Mexican workers equipped with picks and shovels, noted that the digging was far more arduous and slow than anything he had encountered in thirteen previous expeditions to the Southwest. The rocky terrain and the hard cement-like ground broke pick and shovel handles. The tools had to be sharpened frequently.

Dr. Martin has recovered all the stone tools that were in common use 1,500 years ago, but finds nothing that could have been used by the Indians in digging their homes. The only possible conclusion is that the Mogollon Indians used digging sticks—which meant hours and weeks of back-breaking labor, he says.

"Living on a high ridge remote from water, digging homes on its narrow top with primitive tools in hard, rocky soil, the Mogollon Indians had their own housing problem, and it was a tough one," says Dr. Martin.

BOTANICAL EXPEDITION TO CENTRAL AMERICA

BY PAUL C. STANDLEY

CURATOR OF THE HERBARIUM AND LEADER OF THE EXPEDITION

The purpose of the Museum's fifth botanical expedition to Central America, which returned early in September, was to obtain herbarium material to complete the Museum's collection of Middle Central American flora covering El Salvador, Honduras, and Guatemala. Nearly ten months were spent in the field—almost two in El Salvador, two and one-half in Nicaragua, and the rest in Honduras. There, headquarters and every facility for work were supplied most generously by the Escuela Agrícola Panamericana, situated at El Zamorano, 25 miles from Tegucigalpa. The director of this institution is Dr. Wilson Popenoe, distinguished authority on tropical fruits, who was chiefly responsible for the introduction of the avocado into Florida and California.

I left Chicago in early November, 1946, by ship from New Orleans, landing at Puerto Cortés on the north coast of Honduras and proceeded by plane to Tegucigalpa. November and December were spent at El Zamorano. From there, collecting trips were made in all directions, most often in company with Dr. Louis O. Williams, well-known authority on orchids, now a member of the staff of the Escuela Agrícola. His deep interest in the collections and his unstinted kindness and practical assistance were the most important factors in making the expedition completely successful.

Most of January and February, 1947, was spent in El Salvador, where collections were made in the Sierra de Apaneca, above Ahuachapán, near the Guatemalan border, and around Metapán in the northwest, where Guatemala, El Salvador, and Honduras meet on Cerro Miramundo. The work was terminated at San Vicente in central El Salvador, a region celebrated for its varied flora. This country is botanically least interesting of all Central America because most land is under cultivation and the original vegetation and particularly forest remain in only very limited areas.

PINE AND OAK FOREST

Returning to Tegucigalpa and El Zamorano at the end of February, work was continued about the latter place, with frequent excursions into the adjoining departments. This whole region, like most of the Honduran mountains, is covered, except for clearings, by an almost continuous stand of pine and oak. Honduras has a greater area of pine and oak forest than any other Central American country and probably more than all of them combined, at least under present conditions.

March and April were spent in central and northern Honduras, first at Comayagua, once the capital of Honduras and of all Central America. It is situated in a broad valley with scant rainfall and has a distinctive vegetation of a type rare in Central America. There are extensive areas of thorn forest and an unusual display of cacti. Collections of plants were made also in the high mountains about Siguatepeque, in the same department, in pine-oak forest. Later work was carried on near the North Coast, the banana region, chiefly about La Lima in the Department of Cortés, in virgin rain forest about San Alejo in the Department of Atlántida, and at several localities between La Lima and Quimistán in the Department of Santa Bárbara.

At the end of April, I returned to El Zamorano and, on May 12, went by plane to Managua, Nicaragua, remaining in that country until the end of July. Nicaragua was the only Central American country in which I had not collected previously, and botanical collections from the republic are almost non-existent in American herbaria. It proved to be a most delightful country, with kindly people who facilitated the botanical work in every possible manner. I am especially indebted to Brother Antonio Garnier of the Instituto Pedagógico de Varones of Managua, maintained by the Brothers of the Christian Schools, and to his associates, who were most generous in their support of the expedition's work.

TORRENTIAL RAINS

Plant collections were made first in the Sierra de Managua, near the capital. This

is a strange region, rising to only 3,000 feet but, because of its curious climate, which is cold and wet, it supports a luxuriant type of vegetation that ordinarily would not be expected on the Pacific slope at such a low elevation. More than three weeks were passed in the Department of Chontales, first at La Libertad, in the region where Thomas Belt obtained data for his classic volume, *A Naturalist in Nicaragua*. La Libertad lies at the southern edge of the Atlantic rain forest, and there are excellent collecting areas close to the town, but collecting had to be discontinued because of the quick arrival of the first torrential rains of the wet season. Then collections were made about Juigalpa, capital of Chontales, where heavy rain had brought out the flowers and given to the landscape the appearance of early spring in the United States.

Three weeks were spent at Jinotega in the department of the same name, in the general region known in Nicaragua as Las Segovias. The narrow valley of Jinotega, between two high mountain ranges, is one of the most beautiful in Central America, with an almost ideal climate, and botanically of extreme interest. I left there with reluctance, because the vegetation was so rich that it was impossible to exhaust it in the three weeks devoted to its exploration.

The last part of my stay in Nicaragua was devoted to work in the Occidente or West, with headquarters at Chichigalpa in the Department of Chinandega, and a visit to the port of Corinto. It was desired to obtain plants from the Pacific lowlands, and in this the work was partially successful, but the time chosen was unfortunate, and unusual natural conditions seriously impeded the collecting.

VOLCANO ERUPTS

A few days before my arrival at Chichigalpa, a long quiescent volcano, Cerro Negro, in the adjoining Department of León, erupted violently, sending up a column of ash-like sand estimated at 40,000 feet in height. More than four inches of sand fell on the city of León, and a thinner but very annoying layer upon Chichigalpa and Corinto. Every plant was covered with it, and when one touched a bush or tree, showers of sand fell over and inside clothing and into ears and eyes. There was sand in the food and sand in bed at night.

Comfort was not improved by the arrival of vast clouds of *chapulines* or locusts that filled the skies and alighted on the luxuriant fields of corn, often stripping the stalks of their leaves. The ugly insects did much damage also to other crops, a matter of great local importance, since this part of Nicaragua is considered the "bread-basket" of the country.

Most of August was spent again at El Zamorano in Honduras, whence the plant collections were transported by plane to the north coast and by a former U. S. Coast Guard cutter to Puerto Barrios, Guatemala, and by ship to New Orleans. In all, there were obtained during these months about 12,500 separate collections of plants, represented by twice as many specimens. Most of these are from localities not represented previously in the Museum's collections, and it is believed that they include a number of species hitherto unknown to science.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Thomas S. Hughes, Chicago—a Bell Krater vase, red figured ware—4th Century B.C., southern Italy.

Department of Botany:

From: University of Texas, Austin,—650 herbarium specimens, Mexico; J. Soukup, Lima, Peru—126 herbarium specimens, Peru; M. Lucas, Monterrey, Mexico—160 herbarium specimens, Mexico; Museo Nacional, San José, Costa Rica—326 herbarium specimens, Costa Rica; Eizi Matuda, Escuintla, Mexico—1,202 herbarium specimens, Mexico; University of California, Berkeley—145 specimens of algae; Dr. Herbert Habeeb, New Brunswick, Canada—160 specimens of algae, New Brunswick.

Department of Geology:

From: John Robert Gough, Curundu, Canal Zone—collection of fossil invertebrates and plants, Canal Zone; Dr. Rainer Zangerl, Chicago—23 invertebrate fossils, Wyoming.

Department of Zoology:

From: Mrs. Clifford C. Gregg, Valparaiso, Ind.—a frog, Indiana; John G. Shedd Aquarium, Chicago—a European catfish and a leopard shark, California; Dr. Joao Moojen, Lawrence, Kan.—31 mammals, Brazil; Illinois Humane Society, Chicago—a skunk, Chicago.

Library:

From: Roger London, Acting Consul General, Consulate General of France, Chicago, and Dr. Henry Field, Thomasville, Ga.

NEW MEMBERS

The following persons became Members of the Museum during the period from August 18 to September 15:

Associate Members

Samuel H. Gensburg, Romaine M. Halverstadt, Clarence O. Lillyblade.

Annual Members

Dr. Morris Arnkoff, Rev. Oscar A. Benson, Paul Benson, Edward Benjamin, Claude R. Bentley, Donald F. Campbell, Jr., Thomas Edward Cooke, Marvin Frank, E. Richmond Gray, Ralph Haywood, William V. Kahler, T. L. Kelly, Mrs. T. L. Kelly, Dr. Albert T. Lundgren, L. A. Mekler, B. J. Merkle, Aaron Scheinfeld, Charles A. Schoeneberger, Laurence E. Schwab, Joseph T. Shuflitowski, James L. Vincent, James E. Whitaker, William D. Wilkinson.

RESEARCH IN PALAU

Mr. Henry S. Dybas, Assistant Curator in the Division of Insects, will leave October 15 to engage in a co-operative project for the study of the land life of Palau Islands (in the western Pacific) under the auspices of the Pacific Science Board. Mr. Dybas is especially prepared by his experience in collecting in the Mariana Islands during the war for collecting in the Palau group, where a richer fauna connects the life of the Marianas with that of the Philippines.

The Palau Islands are a part of the great Micronesian region of the Pacific formerly under Japanese mandate and now administered by the United States. The Museum has already taken part in the over-all survey program for these islands through the work of Dr. Alexander Spoehr, reported in the September number of the BULLETIN. It is gratifying to have the Museum share in studies on the Palau Islands, since this group is the most favorable site for a future biological station in the region under control.

OCTOBER LECTURE TOURS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the meeting room on the second floor of the Museum); a schedule of these follows:

Wed., Oct. 1—Tales of the Spice Roads—Ancient and Modern Routes of Trade (*Marie Svoboda*).

Fri., Oct. 3—The Earth Blows Her Top. Illustrated introduction in Meeting Room (*Winona Cosner*).

Wed., Oct. 8—What Columbus Did Not See—American Indians Before 1492 (*June Buchwald*).

Fri., Oct. 10—Nature's Fall Color Show—Color Changes Evident in Autumn. Illustrated introduction in Meeting Room (*Miriam Wood*).

Wed., Oct. 15—How Animals Prepare for Winter (*Lorain Farmer*).

Fri., Oct. 17—Fashions in Foods—Effects of Food Customs on People. Illustrated introduction in Meeting Room (*Marie Svoboda*).

Wed., Oct. 22—World Harvests—The World's Food Supply (*Miriam Wood*).

Fri., Oct. 24—Reptiles, Past and Present. Illustrated introduction in Meeting Room (*Lorain Farmer*).

Wed., Oct. 29—Buried Treasure—Coal, Oil, Gems, and Other Minerals (*Winona Cosner*).

Fri., Oct. 31—Masks—Not for Halloween. Illustrated introduction in Meeting Room (*June Buchwald*).

'UNEASY LIES THE HEAD THAT WEARS A CROWN'

By WILFRID D. HAMBLY
CURATOR OF AFRICAN ETHNOLOGY

In the collections of Chicago Natural History Museum there are many objects that at once attract the visitor's eye, principally because of the size and elaborate workmanship. But it is well known that some of the smallest and apparently inconsequential objects have a function and a history which reaches very deeply into the lives of the people from whom they are obtained.

In Hall D, Case 9, are two small round objects which might be hastily passed by as children's playthings. They have, however, a very important function to perform in a dance ceremony of the Ovimbundu tribe of Angola. The objects were collected by the writer during the Frederick H. Rawson African Expedition of the Museum.

The inner ball consists of a rounded seed-box which has been covered with lizard skin, and each of the balls is held firmly in the hands of the dancer who performs with outstretched arms. The onlookers strike his arms and when, as the result of the dancing and striking, he is completely fatigued, he hands the two balls to another dancer who continues the performance; and so the ceremony proceeds for many hours without interruption.

'DANCE OF LIFE'

This simple ceremony has a high symbolic value, for it is a magical prolongation of the life of a sick or dying king. The power and endurance of the dancers is supposed to be magically transferred to the waning spirit of the monarch.

Students of European history are all familiar with the old theory of the divine right of kings and the popular acceptance of the theory that the king could do no wrong because he was God's personal representative. Most of the European wars over a period of many centuries centered around the succession of kings. No sooner was the king dead than rival claimants appeared and politicians of various countries, often for personal reasons, allied themselves with one faction or the other. Some of the wars were long and bitter; for example, the Wars of the Roses, when the houses of York and Lancaster presented rival claimants for the English throne.

ROYAL DIVINITY IDEA PERSISTS

In Africa today this idea of the divinity of kings persists with great force, though it is no longer permissible to carry out the rites of human sacrifice which were at one time offered not only at the death of the king, but on every anniversary of this event. Slaves, wives, attendants, also sacred cattle, where the people were pastoral, were sacrificed in large numbers so that their spirits could go to serve the king in the next world.

The first reading of primitive literature might impress a student with the privilege of kingship. The will of the monarch was usually absolute before the intervention of Europeans, and he no doubt held powers of life or death for all his subjects. The happiness of the people depended very largely on the nature and disposition of the ruler. Many traditions point to monarachs who seem to have varied from benevolent rulers to despicable bullies. Offenses of theft or other misdemeanors against the king were far more serious than those committed against an ordinary civilian, and punishments were excessive. It was seldom, if ever, however, that Negro monarchs imposed long imprisonments. There were fines, mutilations, and death penalties, but it was under Mohammedan rule and not under Negro that the idea arose of subjecting a person to a long incarceration.

SACRED HOUSE, ANGOLA

Here are bows, staffs, and tobacco-pipes of dead kings. A sacred fire burns perpetually. The tribal king goes to the house to be alone and to communicate with ancestral spirits. (Photo by Frederick H. Rawson African Expedition.)

The king, theoretically at least, had much power over the possessions of his subjects, but normally he did not excercise his prerogative, and sudden confiscations of property were the exception rather than the rule. In one part of west Africa the king had the right of trading with his subjects in gold dust, and he had the privilege of using two sets of weights. He employed these in such a way that he gathered an advantage both in buying and selling. The monarch's practice was well known, and the people accepted the procedure as a legitimate means of producing national revenue.

POLYGAMY REQUIRED DIPLOMACY

Perhaps one ought not to regard the possession of several hundred wives as a privilege, for there can be no doubt that many of the marriages were contracted in order to set up a helpful alliance between the king and his influential subjects. Obviously the monarch needed to be a great diplomat in order to avoid creating strained relationships within the various families represented in his large household of women.

A doubtful prerogative of a chief of Angola was a gift of children from his subjects. If male triplets were born, two stayed permanently with the mother, but at the age of five years, one of them was presented to the king whose child he became. There are no statistics to show the frequency of triple births, but it seems that the king was likely to acquire a very large family. The children so adopted have the status of the king's own offspring. The custom still prevails.

One restraint on the king is that in some parts of Africa he is not allowed to walk outside his palace grounds. The idea seems to be that the sacredness of the king will be lost if his feet come in contact with the ordinary soil of the countryside. He therefore has to be carried on a litter.

When a king has observed the various restrictions which pertain to his person and his movements, when he has performed many sacred rites and ceremonies, and after he has acted in a judicial capacity, he still has to face his main obligation.

BODYGUARDS HAD VITAL INCENTIVE

The king is the vital force, the soul of his tribe, and if his physical powers are seen to be waning the greatest depression pervades the country. The king in former times not only resigned as the result of his declining powers but offered himself for ceremonial execution. At that time, and even before the anticipated death of the king, men might be appointed under a title meaning "to die with the king." These guards who had volunteered to die with the king were naturally very solicitous about his welfare, and they protected him against poison and other forms of assassination. They were likely to be the king's most trusted counselors both in peace and in war, for at the death of the king, whether it was voluntary or otherwise, they were forced to commit suicide.

Kingship in Africa has been very closely bound up with the whole spiritual life of the people, and after death the spirit of the king remains with the community which he formerly ruled. His ghost is therefore approached with sacrifices and prayer, for, although in the spirit world, he can continue to exert the greatest possible influence over the living.

In Negro Africa, European and American troops encountered these religious beliefs, which are still surviving and affecting the lives of the people though many of the old customs are forbidden. It will take much tact and good judgment to reconcile the social, religious, and economic ideas of Africans with the cultural background of those who have invaded African soil.

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DELVING INTO UNWRITTEN HISTORY OF THE SOUTHWEST

By PAUL S. MARTIN

CHIEF CURATOR, DEPARTMENT OF ANTHROPOLOGY

The 1947 Southwest Archaeological Expedition of the Museum returned to Chicago from New Mexico in late September. Under the leadership of the writer, for whom it was the fourteenth season of operations in this district, the work of other years was continued. The area of operations is in west central New Mexico, about ten miles southwest of Reserve and about 100 miles north of Silver City. The staff included Dr. John Rinaldo, Assistant in Archaeology, Mr. George Quimby, Curator of Exhibits in the Department of Anthropology, Dr. Ernst Antevs, Mrs. Martha Perry, Miss Molly Allee, Mr. L. G. Johnson, and Mr. W. T. Egan.

The work of the expedition began early in May when Dr. Rinaldo arrived in New Mexico to undertake an intensive and extensive hunt for ancient ruins and camp sites of the Mogollon Indians. In this survey, he was assisted for a week by Mr. E. B. Sayles of the Arizona State Museum staff.

The hunt for traces of ancient villages and camp sites was extremely important and fruitful. Furthermore, it was necessary because we wanted to obtain an idea as to when the Pine Lawn Basin had been first occupied, by whom, and for what length of time. We were desirous of knowing the origin of the culture we had already investigated at the SU site. In short, we needed to ascertain the sequences of this locality and what various cultures had flourished there so that we can reconstruct the history of the Mogollon Indians who inhabited this area centuries ago.

The search for all evidences of Indian occupation of the basin lasted seven weeks. Dr. Rinaldo covered more than 100 square miles in this work and discovered upwards of 100 "sites" where man had once lived.

Much sifting and weighing of evidence needs yet to be done in our laboratories, and the total results of the expedition will be published later by the Museum Press. Certain aspects of the work, however, can now be reported.

Our work shows that the region under study has been occupied more or less continuously for about 6,000 years.

Pine Lawn Basin was first settled about 6,000 years ago by Indians who had no knowledge of pottery or agriculture. We call these early settlers Cochise. They were the ancestors of the Mogollon Indians. The particular objects we found are assigned to a phase of time called Chiricahua. It is probable that the Cochise people wandered into the Pine Lawn Basin from southern Arizona in search of water, because the Southwest was undergoing a severe drought about 6,000 years ago.

SOUTHWEST "APARTMENT HOUSE" ABOUT A. D. 900

Painting restoring six-room surface dwelling in the Reserve, New Mexico, area as archaeologists of Museum expedition believe it must have appeared from study of the fragmentary remains they have excavated during the summer of 1947. Reconstruction is by Mr. Gustaf Dalstrom, staff artist, Anthropology. The walls are uncut boulders bound with mortar mud.

What we actually found in the way of evidence of a Cochise settlement consists of stone tools—grinding stones, hand axes, and scrapers—scattered along an ancient stream bed, and buried at a depth ranging from three to six feet. Apparently a spring furnished water for this stream—a spring that is still flowing today. No houses or firepits were found. This is the farthest north and at the greatest altitude (about 7,000 feet) that Cochise materials have ever been discovered in New Mexico.

The next point of time in this long period of 6,000 years of occupation in the Pine Lawn Basin about which we have a glimmer of knowledge occurs about A.D. 500. At that time a Mogollon culture flourished that we call the Pine Lawn. Briefly, the Pine Lawn people lived on high mesas in crude, shallow pit-houses, used stone tools much like those of the Cochise people, and made pottery and practiced agriculture. These last two items are important because they are accretions or borrowings from a more advanced group who may have lived in adjacent Mexico.

Then about the year A.D. 850 another civilization developed in the area and this is called Three Circle. The Three Circle people also lived in pit-houses, but their tools of stone were somewhat better than those of the Pine Lawn Period, and their pottery was much superior in that it was handsomely decorated.

A little later (about A.D. 900) a different group of Indians invaded the Pine Lawn Basin. It seems likely that they came from north of our area, from near what is now Gallup, New Mexico. We call their culture the Reserve culture and it differed in some respects from the others listed above. Stonewalled surface houses containing eight to ten rooms were erected. These contrasted sharply with the pit-houses of former times. The pottery and tools of stone were likewise different from those of preceding periods.

Thus, during the summer we discovered that the Pine Lawn Basin in New Mexico was occupied continuously for about 6,000 years. Our work has briefly illuminated four new scenes in this long span of time.

Our future work will be directed towards

gaining more knowledge of the history of the area. The results of the survey show there are other civilizations remaining to be studied. We desire to fill in as many gaps as possible so that students will have at their disposal finally a series of studies which will touch upon every major time period for the Pine Lawn Basin.

Sun Worship Indicated

One interesting aspect of the culture of the early Mogollon Indians (about A.D. 500) is the orientation of the houses and of the dead. The entry-way of almost every house faced east or southeast. It is therefore conjectured that the sun played an important role in the religious concepts of these Indians.

The evidence revealed by excavations at SU site and at Promontory site, both Mogollon Indian villages, makes most probable the hypothesis that 1,500 years ago the ancient Mogollons worshiped the sun.

In dealing with extinct peoples of great age, the evidence, because of the effacing effects of centuries, is slim. Everything perishes except durable stone tools, pottery, skeletal material, and the Indians' primitive dwellings.

ENTRANCES FACE EAST

The orientation of the skeletons and pit-houses (circular ground pits, approximately twenty feet in diameter and three feet deep) first led us to suspect that these primitive Indians regarded the sun as a deity. Approximately fifty early Mogollon houses have been dug and thirty skeletons uncovered, and in every case the pit-house entrance faces east while almost every skeleton faces west. There were few exceptions to this rule.

When people with a crude, primitive culture take the time and effort to orient both their houses and their dead in such a definite manner, the motive behind it must be significant.

Existing on a very low subsistence level, the Mogollon Indians must have felt acutely the slightest fluctuation in Nature's bounty.

FEARED THE DARK

Like all primitive peoples, the Mogollons must have been aware of the fact that it was the sun's rays that made things grow. They were happy in the light and warmth of the sun's rays and cold and fearful in the dark. This is a generalization that can be applied to virtually all primitive peoples.

To the archaeologist, as well as to other present-day scientists, the importance of the sun is well known. Without it, man could not exist. Thus the worship of the sun causes not a flicker of the archaeologist's eyelash.

Lest we scoff at the simple beliefs of the Mogollon Indians, we should remember that our own ancestors were also sun worshipers, and built Stonehenge in England, and other similar places of worship. It has only been in comparatively recent times that man has ceased to regard the physical manifestations of the universe as objects of veneration, and vestiges of such forms of worship still remain in many places.

THEIR ALARM CLOCK

Aside from the religious aspects, the house orientation was a very practical one, for on chilly mountain mornings, everyone is thankful for the sun's heat—including shivering archaeologists! The houses of the Mogollon Indians caught the first beams of the morning sun—a far gentler and more pleasant alarm clock than civilization's electric variety.

The orientation of the burials is certainly important. The sun in its daily journey gradually drifts into unknown darkness. Death has always been termed a journey into a dark and unknown land. The analogy was most popular during World War I—a dead comrade had merely "gone west."

The Mogollon Indians apparently had parallel concepts.

COSTUMES OF GUATEMALA IN A SPECIAL EXHIBIT

A special exhibit of Guatemalan costumes will be opened in Stanley Field Hall on November 1. These Indian costumes are from a beautiful and representative collection of Guatemalan textiles recently presented to the Museum by Miss Florence Dibell Bartlett, of Chicago.

Miss Bartlett has for many years been interested in native Indian handicrafts, especially weaving, and has collected examples of them during her travels in Central and South America, as well as in the Southwest of the United States. She obtained the collection that she has now given the Museum during a journey to Guatemala in 1936. The costumes in the Museum exhibit are draped over stylized figures of Guatemalan natives carved in mahogany. The manikins also were presented to the Museum by Miss Bartlett.

GUATEMALAN COSTUMES

Four of ten carved mahogany manikins on which are displayed some of the native costumes of Guatemala presented to the Museum by Miss Florence Dibell Bartlett. In the center, Miss Dawn Davey of the Museum Library staff demonstrates how one of the costumes might be adopted in the current "new look" fashion development.

The Indians of highland Guatemala are justly famous for the beauty and technical perfection of their hand weaving. Each village has its typical costumes, easily distinguishable from the costumes of neighboring villages. As a result, the traveler in Guatemala sees an amazing variety of color and design, and at the weekly markets and along the roads he can identify the villages from which the men and women come by the costumes they wear.

In the exhibit the color and variety of Guatemalan weaving are well represented.

The cotton and woolen materials from which the costumes are made are woven on the belt or backstrap loom, which has one end fastened to a post and the other to a belt passing around the waist of the seated weaver. The correct tension on the warp threads is maintained by pulling back on the belt. The width of cloth woven on a belt loom is limited to about thirty inches, which is the span the weaver can conveniently reach. In some regions wider cloth is woven on the foot or treadle loom of European type.

The most spectacular garment is the full blouse worn by women, called a *huipil*, which is ornamented with elaborate and colorful geometric designs and the figures of animals and birds. Decorated belts, headbands and head cloths are also outstanding. At first glance the designs appear to be embroidered, but they are actually brocaded; that is, they are woven into the fabric so that the designs are complete when the material is taken from the loom. Embroidery is little employed in Guatemala except to ornament seams, hems and necklines. In some regions woolen belts are embroidered. —D.C.

MY FIRST GRIZZLY

By C. M. BARBER

(Mr. Barber concludes his account of the strange chain of incidents that brought the fine grizzly bear skins from Chihuahua to the then Field Museum. The first installment appeared last month.)

The next day I was out for deer for trap bait. Climbing to the top of a low mesa I looked over the edge. Fifty yards away was a buck lying in the grass with his head high, looking at me. Since I could see nothing but his head, I decided to risk a shot at it. At the gun, the head dropped. Rushing forward, I dropped my rifle, grabbed a horn with my left hand, and reached for my hunting knife to bleed the deer. At that instant he came alive, jerked free with one big jump. In two more jumps he was on and over the rim, out of sight. Grabbing my rifle I followed fast.

I soon saw him standing with head down and very sick. A careful heart shot finished him. I then discovered that my first shot had hit the burr of an antler, half severing it. The concussion had temporarily knocked him out, then made him sick. After loading the deer onto my saddle I reached for my pipe. It was gone. I searched the vicinity for an hour. I went over my back track for some miles, but no luck.

By the time I reached camp, I was really hungry for a smoke. No good Mormon uses tobacco, though of course there are a few that do smoke on the quiet. At Garcia there was always the chance of meeting some traveler from the U.S.A. I at once decided there were some items we needed in camp from the store, as I now explained to my partners. Cluff gave me the eye. Said he, "What do we need besides a pipe for you?" Fortunately, I could show him that both salt and coffee were low.

VISITORS FROM THE EAST

Next morning, long before day, I was astride my best horse and on the trail to Garcia forty miles away. It was a lonesome, hard, day's ride. I went at once to Mrs. McDonald's boarding house. She informed me she had four visitors from New York. A Mr. Smith, a rich timber buyer, was their leader.

"Mr. Smith," said I, "I am down here collecting scientific specimens. I am in trouble."

"What is your trouble, young man? I will help any one I can that is in trouble."

I told him about the loss of my pipe.

"I presume you have also lost your tobacco and matches."

I assured him I had plenty of both.

"Well," said he, "I hate to see a man suffer. Now we have two pipes between the four of us—we can get by with one, so here you are my boy, a present for you."

He handed me a well-colored corn-cob pipe. I filled it at once and was happy again.

Vernon Shaw Kennedy was a Chicago tea merchant. A Scot by birth, he had traveled over much of the world. Hunting tiger in India or Kodiak bear in Alaska were old stories to him. He came to the Sierra Madre that fall with one 50-pound bear trap, some good rifles, and a fancy new camera. He wanted to secure some Mexican grizzlies and a few mountain lions to give to Chicago's natural history museum (then Field Museum).

At Colonia Garcia he hired a Mormon guide, then traveled to the western rim of the plateau. Thirty days of hard hunting there convinced him that game was too scarce for any real success. He returned to the Mormon colony for a fresh start. There, through my chance contact with Mr. Smith, he learned of our success some forty miles to the south. Kennedy wanted to photograph some game; so he set out to join us. He cut across our trap line the second day. However, it took him another whole day to locate us at our camp.

I invited him to camp with us. Every animal we had taken was measured and preserved as a scientific specimen for study or mounting purposes. I hoped Mr. Kennedy might purchase our entire catch. He was shown every skin and skull.

That night I spread out a real camp dinner. We had venison steaks broiled in a dry skillet over the coals, Mexican beans baked with fat bear meat, black coffee, and dried peach sauce. We had brown gravy and a big Dutch oven full of sour dough biscuits, shortened with bear oil. After supper, Mr. Kennedy told us tales of hunting tiger and Alaskan mountain sheep. After hearing of his kills, we felt that he had plenty of courage and knew that he must be a dead shot.

On the trap line next morning we ran into good luck. As we topped a low saddle, we saw a grizzly in the first trap set in a small dry bottom. He had only made a jump or two before wrapping the trap chain around a sturdy oak sapling. Cluff and Kennedy covered me with their guns as I rode down fairly close to be sure the bear was safely caught. His forefoot was in the trap. He seemed to know he was hopelessly trapped. He made no move as I rode completely around him, but he watched me very closely.

APPROACH WITH CAUTION

We left our horses out of sight on the ridge top and on foot approached the bear through the open pine forest. Cluff and I had our rifles all ready. Kennedy came along with rifle and camera. At about one hundred yards Kennedy called a halt. He said, "Mr. Barber, if the bear makes a supreme effort, don't you know that he might break a trap spring and then charge?"

He tried to locate the bear on his finder but could barely see it. At twenty-one, a man has too much courage, but very little judgment. "Mr. Kennedy, you will get no good photos here. Why not go nearer? Cluff and I will protect you."

CAMERA SHOTS, TOO

Giving Cluff the nod, we moved toward the bear. Facing us, the bear watched steadily but made no move. I felt pretty silly walking toward that powerful brute. I have often wondered what I would have done if he had charged us, trap, tree, and all. We stopped the advance at about 100 feet. Mr. Kennedy joined us. I suggested he lay down his rifle for better use of the camera. He replied, "No doubt you men know your bear, but I feel safer with a rifle in my hand."

When the photos were all taken, I suggested he shoot the bear. With a single heart shot he killed it instantly. This bear, a young but mature male, was very dark in color, showing only a few grizzly tipped hairs.

After skinning the bear, we went on around the circle of traps. In one of these we found a fine big mountain lion. Mr. Kennedy got good photos of the lion and then shot it. As we returned to camp I completed the sale. Mr. Kennedy bought our entire catch.

NOVEMBER MOVIES FOR CHILDREN

The James Nelson and Anna Louise Raymond Foundation will continue its autumn series of free Saturday morning programs for children through November. The programs begin at 10:30 A.M. in the James Simpson Theatre of the Museum. On the final program, November 29, as a special feature, Anauta, a native of Baffin Island, will appear personally to tell the story of his native land.

Children may come alone, accompanied by adults, or in groups from schools, clubs, community centers, etc.

Following is an outline of the programs:

November 1—STORY OF THE SEASHORE
Also a cartoon

November 8—CAVALCADE OF MARBLE
Also a cartoon

November 15—MY FRIEND FLICKA
(Repeated by request)

November 22—EAST OF BOMBAY
Also a cartoon

November 29—STORY OF BAFFIN ISLAND AND ITS PEOPLE
Told by Anauta, a native of Baffin Island

Change in Visiting Hours

On November 1, winter visiting hours, 9 A.M. to 4 P.M., go into effect at the Museum, continuing until February 29.

SOUTHWEST REPTILE HUNT, THE LATEST IN SPORTS

By CLIFFORD H. POPE
CURATOR, AMPHIBIANS AND REPTILES

WHEN a chamber of commerce in Arizona advertises attractions of the state, one of the major claims of distinction is apt to be overlooked. This is the superb rattlesnake fauna—and the latest thing in sports, snake hunting! No other area of the earth boasts twelve different kinds of rattlesnakes, and the only areas that even compete are adjacent New Mexico, southern California, and northern Mexico.

During my recent sojourn of seven weeks in Arizona and New Mexico (*New Mexican*

Zoological Field Trip, 1947) each of the five rattlesnakes found and caught by members of my party represented a different species. First, we found an Arizona prairie rattler in a high, mesa-rimmed valley south of Springerville in eastern Arizona; second, a Pacific rattlesnake at an elevation of 8,100 feet in the moist evergreen forests of the Santa Catalina Mountains near Tucson; third, a Mohave rattler in the desert near that city; fourth, a black-tailed rattler in the much drier mountains near Reserve, western New Mexico; fifth, a western diamond-back resting in the shade beside a cattle tank near Columbus, southern New Mexico, at 4,050 feet.

The universal distribution and the abundance of species could scarcely be more fully confirmed. Those chamber of commerce boasters might truthfully advertise, for example, something of this sort: "Eleven times as many species of rattlesnakes found in the southeastern corner of Arizona as in the entire state of New Jersey." Perhaps this would help relieve over-crowded Tucson.

You'll Probably See None

It does not follow that rattlers are frequently encountered by tourists in all parts of the Southwest because, throughout the more arid regions, snakes are seldom seen by any but the initiated. By "initiated" I mean those who have learned to hunt them at night. The explanation is not far to seek: the desert gets so warm during the day that not even a snake can stand contact with the hot soil, and therefore all of them seek either the shade of bushes or, more frequently, the cool depths of some rodent burrow. Needless to say, the rattler is anything but welcome in a burrow where it may kill two birds with one stone by securing a meal at the same time that it escapes the lethal heat. A rattler released on hot desert sands must find refuge in a few minutes or perish. The enormous rodent and rabbit population of Arizona and New Mexico thus does the rattlers a double turn: it solves their housing problem and fills their bread basket.

In New Mexico alone there are more than a hundred different kinds of rodents and several species of rabbits. The adults of some are too large or formidable for the snakes to eat, but the young of nearly all make dainty reptilian snacks. The lack of trees often forces the small mammals to nest in places easily reached by the snakes. Inhospitable as the desert may appear to us, it is the home of a multitude of animals.

A New Sport

Hunting snakes at night on the desert is a unique and fascinating sport developed in recent years by a few devotees. These addicts, however few in number, have worked so intensively that virtual "schools" have developed. The hunting is done in an automobile. Minor points, astonishing to the layman, are debated with great vigor. Just how fast should one drive? Should the hunter use only paved roads, and if he does should he keep his eyes fixed on the pavement or should he scrutinize the road's shoulders? At what temperature and wind velocity are most specimens to be found? The hazards of this sport are few if the worker confines his activities to the less-frequented roads where danger of collision from the rear is small: when the quarry is sighted, there is little time for a cry of "Tally-ho!" or even a proper signal to a car approaching from the rear.

We were introduced to this nocturnal sport by Mr. William H. Woodin, III, of Tucson, who has become an expert. Starting one night from the famous San Xavier Mission south of Tucson, we divided our collectors between two cars and headed northward. The lead car had gone but a short distance when its lights spotted the Mohave rattler already mentioned. The driver stopped with a jerk that threw everyone half off the seats. My chief collector had little difficulty picking the snake up

"behind the ears" after pinning it with a stick. This apt, if a little unscientific, indication of the point of seizure originated with the senior member of the party, our instructor's grandmother, whose presence proved that this type of collecting can be enjoyed even by grandparents with spunk. The remark is apt because it emphasizes the absolute necessity of grasping a rattler as close behind the head as possible; otherwise, it may turn and bite the restraining fingers.

Farther on, a long-nosed snake was found. This is a harmless and beautiful red and black desert snake. On a previous night we had seen tarantulas, horned toads, and a gecko. This last is a remarkably soft-skinned lizard that walks about with slow, deliberate movements like those of a prowling cat, and holds its body well off the ground. If anything looks out of place on a desert it is this gecko. It is never seen abroad during sunny hours because its delicate body could not endure the intense heat. We also found a leaf-nosed snake, one of the desert reptiles that was known to science from few specimens before night collecting proved it to be common. This, incidentally, is the fate of most animal rarities; sooner or later each one is proved to be anything but rare by the discovery of its true habitat or, in this case, behavior.

Snakes That Aren't

I may have made this motorized night collecting sound very easy, but it is not. There are many pitfalls: simply sighting the animals is amazingly hard; then there is the difficulty of mistaking for prey every one of the great variety of objects lying on the road. Straws, sticks, stones, and domestic animal excreta all cause much wear and tear on the brake and throat linings of the novice. Especially exasperating are discarded fan-belts—they look like snakes even in daylight Mr. Woodin says that his really nerve-shattering enemy is the hay truck on a windy night. When unfortunate enough to follow in the wake of such a truck without sighting it, he is tantalized by the straws that it occasionally sheds. These look like snakes but, dislodged by the gust of air from his car, often blow away ere he has stopped and backed to what surely is the proper point. A fruitless search, first on the road and then along it, leaves him doubtful of his sanity.

Our reconnaissance of reptile and amphibian habitats in New Mexico and Arizona took us to Oraibi in the heart of the great Hopi-Navajo Reservation of northeastern Arizona. This arid plateau holds special interest for herpetologists because it is in remote Hopiland that the annual snake dance, the Hopi prayer for rain, is held. In this elaborate ceremonial, wisely staged in late August when it is most likely to rain, large snakes, both harmless and venomous, are carried about with apparent recklessness in the mouths of the dancers. We arrived

too early in August for the dance, but one of the Hopis promised to put us on the mailing list for invitations in 1948. The current press reports that we missed a double show: the 1947 prayer for rain was answered by a cloudburst that stranded hundreds of tourists on the desert, the roads of Hopiland being entirely without "surface" and therefore impassable after a heavy downpour.

While walking about Oraibi, which incidentally is the oldest continuously inhabited site in the United States, we found a "horned toad" whose behavior would have been truly alarming had the reptile been a hundred times bigger. The little lizard (a reptile not even remotely related to the toads, which are true amphibians) measured only four inches from stem to stern, and, like "Mr. Five-by-Five," is almost as wide as long. Unlike that rotund human, the lizard is very flat and its skin, especially in the region of the head, is set with sharply pointed scales and spines.

A Great Bluffer

The individual in question, as if conscious of its grotesque appearance, puffed itself up, stood high on its finger and toe tips, opened its mouth, and proceeded to rock back and forth in a manner that clearly meant, "Look out for me, I'm a tough guy!" The dark lining of the mouth, the wide gape from which issued sharp hisses, and the crown of spines combined to enhance the ludicrous effect of a sight that even Alice in Wonderland could not have dreamed. If we moved, it wheeled to face us and, once, even charged me. I was in hopes that it would squirt blood out of its eye as some kinds of horned toads do, but it would not put on this part of the show. When I picked it up and put a finger between its jaws they did not close; at heart it was about as dangerous as Tweedledum and Tweedledee together. Like most other reptiles, it was only a great bluffer. Actually, the most formidable

thing about this little creature is its scientific name: *Phrynosoma douglassii hernandesi.*

Few of the thousands of tourists who zoom back and forth across our deserts think of these dry, treeless regions as anything but "god-forsaken." This may be a reasonable point of view from a car speeding at 75 miles an hour; the surrounding world of boundless interest is reserved for those who tarry long enough to enter it. With difficulty we restricted our own interest to one tiny niche of this world and yet in two months we scarcely scratched the surface. The performance of the little horned toad is a sample of what one may see.

Ghost-White and Elusive

It was not long before we were again thrilled by the reptile life of the desert. This was in the White Sands of the Tularosa Basin, a broad, flat valley of south central New Mexico. Here an ancient deposit of pure gypsum (plaster of Paris) constitutes the "white sands," which cover an area of about 350 square miles. These unique dunes are free of vegetation in places, sparsely grown with low desert plants in others. In these less barren stretches, lizards abound but, instead of having conspicuous colors like individuals of the same species in the surrounding parts of the Southwest, they are pale or almost white like the dazzling sands about them. This makes them extremely hard to find. Close examination showed that of three kinds seen in abundance one was so white that it could scarcely be detected when it lay motionless. In the other two, the usual pattern was evident but its colors showed little contrast.

Selective Process

Presumably, over the thousands of years that the lizards have lived on the white surface, the darker individuals have been weeded out by predators so that only the lighter ones were left to reproduce. It is not the belief of zoologists that this weeding out process causes more pale lizards to be born; it only "selects" them among millions that hatch. The light specimens thus have an advantage and will in time predominate and the paleness even become fixed. Fortunately, these beautiful dunes, now part of the White Sands National Monument, are being preserved intact with their remarkable fauna and flora.

Upon leaving the dunes we had time to go only into the forested mountains to the east of the Tularosa Basin. There, in the different world of the moist evergreen forests on the slopes of Sierra Blanca, which rises to a height of 12,000 feet, we searched in vain for the rarer of the two salamanders known to occur in New Mexico and Arizona. This was the second defeat of the trip: a few weeks earlier in Mexico, Mr. Charles M. Bogert of the American Museum of Natural History, New York, and I had made a fruitless search of Chihuahua sand dunes for a hypothetical fringed-footed sand lizard. But, as we sped eastward on our return journey, these defeats only beckoned us to return to the marvelous deserts and forests of our Southwest.

In Case 15, Hall 7 is the Southwest archaeologist's most important method of computing dates. The method is that of tree-ring dating.

FIVE ADULT LECTURES IN NOVEMBER

Five more free illustrated lectures in the autumn course for adults remain to be given on Saturday afternoons at 2:30 during November in the James Simpson Theatre of the Museum. Of special interest is the November 8 lecture, "Archaeologists in Action," by Dr. Paul S. Martin, the Museum's own Chief Curator of Anthropology, in which he will tell of his latest finds during

FILMING EXPEDITION FOR LECTURE

The Museum's cinematographer, Mr. John W. Moyer (left) on field assignment with Archaeological Expedition to the Southwest, making natural color films which will be shown with Dr. Paul S. Martin's lecture on Saturday, November 8. Dr. John Rinaldo of the expedition is seen at right. Note excavated human skull in foreground.

excavations of prehistoric sites in the Southwest, conducted last summer.

In addition to telling of his most recent work, Dr. Martin will review the discoveries made in his fourteen seasons of research in the same general area.

The dates, subjects and lecturers for November are as follows:

November 1—ANTARCTIC ADVENTURE
Carl Eklund

November 8—ARCHAEOLOGISTS IN ACTION
Dr. Paul S. Martin

November 15—HUDSON BAY ADVENTURES
C. J. Albrecht

November 22—THE NATURAL HISTORY OF MOSSES
Dr. William C. Steere

November 29—RAMS OF THE RIMROCKS
Cleveland P. Grant

No tickets are necessary for admission to these lectures. A section of the Theatre is reserved for Members of the Museum, each of whom is entitled to two reserved seats. Requests for these seats should be made in advance by telephone (WABash 9410) or in writing, and seats will be held in the Member's name until 2:30 on the lecture day.

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THE BULLETIN

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Members are requested to Inform the Museum promptly of changes of address.

STAFF NOTES

Mr. Carl W. Hintz, Museum Librarian, has been appointed Chairman of the Librarians' Section of the American Association of Museums for 1948. . . . **Miss Jane Sharpe,** of Dixon, Illinois, a graduate of the University of Wisconsin, has been appointed as a guide-lecturer on the staff of the James Nelson and Anna Louise Raymond Foundation. . . . Two radio bradcasts on tribal life in Portuguese West Africa were given recently by **Dr. Wilfrid D. Hambly,** Curator of African Ethnology. One was over Station WLS and the other over WBBM on a coast-to-coast network. Dr. Hambly was called upon to appear because of the publication of his new book, *Jamba* (The Elephant). . . . **Mr. Harry Changnon,** Assistant Curator of Geology, and **Mr. R. K. Wyant,** Assistant Curator of Economic Geology, participated last month in the Tri-State Geological Field Conference held in various parts of Wisconsin.

Collectors Leave For Peru

Early in October Mr. Paul Scherer and Mr. Robert E. Shroll left by air from Miami for Pebas, Peru, a well-known port on the Amazon River. They have been commissioned to collect mammals, birds, reptiles, and fishes for the Museum.

Mr. Scherer was born in Brazil and his boyhood was spent hunting and fishing with the Indians so that he is especially familiar with the fauna and how to hunt in the jungle. After some years at school in the United States, and foreign service in the Air Corps during World War II, he is returning to visit his parents who are missionaries in Peru.

Mr. Schroll, also an Air Corps veteran, accompanies him as helper and for experience. They plan to remain in Peru about six months.

Miss Florence Dibell Bartlett Elected a Contributor

Miss Florence Dibell Bartlett, a Life Member of the Museum, was recently elected a Contributor by the Board of Trustees in recognition of her gifts to the Museum valued at more than $10,000.

NEW MEMBERS

The following persons became Members of the Museum during the period from September 16 to October 15:

Contributors

Miss Florence Dibell Bartlett

Non-Resident Life Members

Mrs. Cornelius Osgood

Associate Members

David W. Kimball, Griffith Mark, Henry B. Sincere, Holgar G. Swanson.

Sustaining Members

Mrs. John Knight

Annual Members

William A. Benson, Carl H. Christiansen, Henry Cizinauskas, J. S. Clifford, Wallace L. Cook, Charles G. Culver, C. B. Hart, Frank W. Hughes, Miss Frances Ione Hutton, Julius Johnson, Harry Lasch, Howard Lipsey, William B. Lloyd, Jr., Albert G. McCaleb, A. T. Milbrook, Ben Mills, E. J. T. Moyer, James P. Oliver, Mrs. Stuyvesant Peabody, Mrs. Dorothy W. Radack, J. C. Tucker, Andrew L. Valentine, Lee B. Vastine, Charles Velvel, Carl J. Weitzel, James D. West, Emerson C. Whitney.

NOVEMBER LECTURE TOURS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the meeting room on the second floor of the Museum); a schedule of these follows:

Wed., Nov. 5—Smoke Tales—Unusual Uses of Fire (*June Buchwald*).

Fri., Nov. 7—Costumes from Guatemala—(The new Florence Dibell Bartlett Collection of Textiles.) Illustrated introduction in Meeting Room (*Harriet Smith*).

Wed., Nov. 12—Villains of the Animal World (*Lorain Farmer*).

Fri., Nov. 14—Plants That Go Together—Plant Societies of the Tundras, Deserts, Swamps, Forests, and Mountains. Illustrated introduction in Meeting Room (*Marie Svoboda*).

Wed., Nov. 19—Medicinal Plants (*Marie Svoboda*).

Fri., Nov. 21—Land of Chicago—Geology of the Chicago Region. Illustrated introduction in Meeting Room (*Winona Cosner*).

Wed., Nov. 26—Feast Days and Fast Days—People and Animals Have Fasts and Feasts (*Miriam Wood*).

Fri., Nov. 28—From Cradle to Classroom—Training of Children the World Over. Illustrated introduction in Meeting Room (*June Buchwald*).

There will be no tour Thursday, November 27, on account of the Thanksgiving holiday, but the Museum will be open to visitors that day.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Mrs. Alice H. Gregory, Chicago—36 handwoven textiles and 2 costumed dolls, Guatemala.

Department of Botany:

From: O. D. Phillips, Belize, British Honduras—49 herbarium specimens, British Honduras; Prof. Eizi Matuda, Escuintla, Mexico—117 herbarium specimens, Mexico; Prof. J. B. McBryde, Denton, Tex.—118 herbarium specimens, Texas; University of Texas, Austin—193 herbarium specimens, Mexico, New Mexico, and Texas.

Department of Geology:

From: Maurice Petit, St. Thomas, Virgin Islands—20 Upper Cretaceous invertebrate fossils and 3 lithological samples, Virgin Islands; Arthur C. Price, Los Angeles, Calif.—a collection of invertebrate fossils, California.

Department of Zoology:

From: Maj. Howard T. Wright, United States Army—308 insects and allies, Japan; Chicago Zoological Society, Brookfield, Ill.—a bird specimen; John G. Shedd Aquarium, Chicago—2 fish specimens, Amazon and Florida; Lincoln Park Zoo, Chicago—a European water snake, and a lizard from Haiti; Delzie Demaree, Johnston, Ark.—82 specimens of fresh water clams, Arkansas.

Library:

From: R. W. Bliss, and Carnegie Institution of Washington, both of Washington, D. C.; Boardman Conover, José Cuatrecasas, Stanley Field, Henry W. Nichols, and A. Wood, all of Chicago.

THE INSIDE STORY OF THE TARSIER

By HARRY HOOGSTRAAL
ASSISTANT CURATOR OF INSECTS

"WOULDN'T it be great if we could get half a dozen tarsiers!" The speaker, Lieutenant Donald Heyneman, always an optimist, was sitting in my tent in an abandoned rice field just outside Manila, helping plan the Philippine Zoological Expedition for the Chicago Museum. "I'll be happy with half that number," I told him, and secretly hoped for at least *one*. Six months later Don was traveling back to the States with a serious case of malaria and I was in Mindanao heatedly telling Monobos and Bila-ans not to bring me any more tarsiers—I already had too many.

There are practically no references in the literature to the tarsier in its wild state and the several known species, ranging from the central Philippine Islands through the East Indies, have always been considered fantastically rare. Yet the tarsier is regarded by anatomists as a tremendously important animal. It is one of man's closest relations, closer even than the monkeys, which are considered to climb off on a separate branch from the tarsier and man on the "Tree of Life," though both stem from more primitive primate stock.

Visitors to Brookfield Zoo, where two specimens of the Mindanao tarsier, *Tarsius carbonarius*, are now living, usually first remark on their small size, which is no larger than that of a medium-sized rat (they have an equally long tail, too); and secondly on their strange appearance, which according to particular fancies is a cross between that of a monkey and of a bat. Tarsiers are strictly nocturnal and during the daytime one sees a lightly mottled, slate-colored furry little animal with almost naked, large, bat-like ears, and a long tail, hairy only near the tip, clinging tightly to a branch with strangely human hands and feet. The face is like that of a chinless, low-browed man, without snout, but the eyes are remarkably enlarged and close together and occupy most of the front of the head. During the daytime the iris is only a pinpoint, but as light dims, the central circle enlarges until it occupies much of the eyeball.

BALL-BEARING NECK

The eyeballs are hardly if at all mobile, but the head can be turned an astonishing 160 or 170 degrees, just before it appears that it will twist completely off its short neck. The tiny nose lies just below the great eyes and above the wide, thin mouth, which, when open, reveals a glistening set of needle-like, closely spaced teeth.

As surprising as the round, peering head are the long, bony hands and feet, the palms and soles of which have small fleshy pads and some of the fingers and toes of which have greatly expanded disks, both modifications for the animal's clutching mode of sleep. Some of the toes and fingers have tiny protruding claws and others flattened forerunners of our fingers and toenails. To go to a more distant branch or to make progress over the ground, it stands up on its greatly elongated hind legs, which are lengthened by an unusual elongation of two of the tarsal, or ankle, bones (from which peculiarity the generic name is derived), places its arms almost straight out or slightly bent at the elbow, and from its toe-tips jumps in a low trajectory so far that the observer jerks his head to see where the little beast landed. We have not measured its jump, but consider three to four feet to be a conservative estimate. Our guess, when they jumped from trees that were being felled in Mindanao, might have been even longer.

TARSIER IN CAPTIVITY

One of the tarsiers now living at the Brookfield Zoo. The ears are partly folded back, in the strange manner peculiar to the tarsiers. (Photograph by Catherine Hoogstraal Walker).

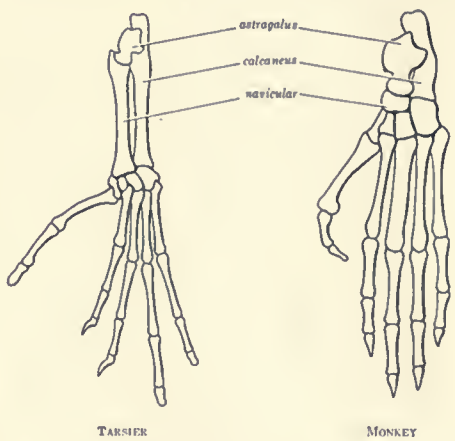
BROAD STUDIES PLANNED

Anatomically the tarsier is an interesting combination of primitive and more advanced characteristics, and specialized and unspecialized characteristics. For instance, many features of the brain, the number of vertebrae, and the viscera are primitive or archaic, and relate the tarsier to other lemurs. The erect position, the general form of the skull and face, the aortic arches, and several features of the urogenital system are highly advanced, or anthropoid, in character. The specializations peculiar to the tarsier for nocturnal vision, clinging, and leaping fascinate not only the zoo visitor but the anatomist, to whom these characters offer many interesting problems.

The series now at the Museum, which is considerably more extensive than any other material available, will be studied not only by the staff but by numerous other anatomists and medical men in other parts of the country. Studies which will be under way shortly concern themselves with the urogenital system, dentition, embryonic development, the eye and retina, limb musculature, the brain, and the contents of the stomach. As the presence of this series becomes more widely known, other specialists will undoubtedly request material for further study.

We knew before starting our Philippine work that *Tarsius fraterculus*, the peculiar species inhabiting only the island of Bohol in the Visayan group of the Philippine Islands, was usually found in bamboo clumps, but otherwise had no information on where to look for *Tarsius carbonarius*, the Mindanao species. It was entirely a surprise when Arturo Castro, our hardest-working Filipino assistant, came running into camp one morning yelling at the top of his voice that he had gotten a tarsier, and in a rat trap at that. We were ending our first month in Mindanao, and had been camped during that time between 3,000 and 8,000 feet elevation on Mt. McKinley in the Mt. Apo range. Tongue-like areas of abaca, the banana plant that is stripped for its tough fiber and comes to us as Manila hemp, reached our 3,500-foot camp in a sheltered valley. Beside it was old second-growth forest, and above it to the peak, original forest and stunted mossy forest. Naturally we had kept our eyes open for tarsiers in each of these types of growth.

Castro's smoked-coconut baited trap line that week was at about 3,600 feet around old fallen logs at the edge of original and old second-growth forest, and each morning he had sadly reported little or no catch. I had examined the line the day before the great catch and, judging it to be rather poorly



ORIGIN OF TARSIER'S NAME

The peculiar tarsus that gives the names tarsier and Tarsius to the small Philippine primate. Compared to the tarsus of a monkey (right).

For photographs of the tarsier in its natural surroundings, see "Pangolins, Tarsiers, and Flying Lemurs of the Philippines" by Karl P. Schmidt, Chicago Natural History Bulletin, Vol. 18, No. 7, July, 1947.

set, suggested that he move it to a more promising location the next morning.

We carefully combed our prize tarsier for external parasites, of which it was singularly free, as were all the tarsiers we examined later, and the whole camp kibitzed as Castro nervously made up the skin and I tried to imagine which way the exacting mammalogists in Chicago would want its strange legs and head arranged. We put the remarkable eyes in formalin, and then injected the remaining carcass with formalin for the Museum's Anatomy Division. All of the 200 traps out were then reset where we supposed they might catch the most tarsiers, and our eyes were as large as a tarsier's as we intensified our hunt for them in the forest. But we never found another much above sea level or in original forest or old second-growth forest.

LIVE SPECIMENS CAPTURED

When our Mt. McKinley operations ended a few weeks later we decided to warm up and dry out with some lowland collecting at the northern end of Davao Gulf. While there, a Moro brought in our second specimen, this one alive, which he said was taken in a thicket near his field. At this time our own collecting and the specimens brought in by Filipinos were so fruitful that we could hardly care for everything properly, and so I regretfully ordered that the second tarsier become a victim of the "no pets or wild animals" rule, though my popularity with the rest of the members was hardly increased by this action.

Most Filipinos know nothing of the tarsier, but from time to time, in reply to our constant queries, one would tell of tarsiers in great abundance, and always they were in bamboo or low, thick, rather new second-growth forest. We were packing specimens for shipment to the States and preparing to go back into the mountains when an unusually reliable Filipino told us that he knew of an exact bamboo clump spilling over with tarsiers only a bumpy day's jeep ride from Davao City where we were at the time. It took absolutely no urging to get Floyd Werner and Manuel Celestino to take a couple of days' vacation from packing specimens and supplies to look the bamboo clump over with our informer. Our third tarsier returned with them. Werner and Celestino had been alternately banging at the thick bamboo with a club and watching for tarsiers to jump out. When, at last, one did, it was quickly dispatched with .22 shot. After they tired themselves with this exertion they tried smoke and then cutting the bamboo, but no more tarsiers presented themselves. Filipinos living nearby said that they had seen several only the week before, but had seldom seen any during wet seasons, and the rains had just begun.

In December, an American veteran of the Spanish American War, who had lived on his isolated coconut plantation ever since that time, told us that William Joyce, the son of another veteran, who lived on the east coast near the southern end of Mindanao, had once mentioned animals like a tarsier on his land, and that this man would be available the next day. To this day I regret my skepticism when Joyce replied the next morning, "Oh, yes, we have lots of those little animals on our place, come down with me and get some of them."

We had just been joined by Charles Wharton, another discharged soldier, who had stayed in the Philippines to make arrangements for handling monkeys for the Infantile Paralysis Commission, and then had decided to stay on for awhile and make his fortune collecting animals for American zoos. Chief Curator Karl P. Schmidt had always much impressed us with one of his pet maxims, that zoos should be a source of much valuable scientific information concerning animals, and so we happily invited Wharton to attach himself to our group when we went to Joyce's place, and offered him our facilities and co-operation. Wharton was able to purchase even more specimens than he could conveniently handle when once we arrived, and it is a tribute to his tender care of his wards that he was able to reach the States with thirty live ones. So far as we have been able to find out, only one pair of tarsiers had previously been exhibited in an American zoo—that in San Diego.

HANDS OF A TARSIER

Closeup view showing the claws, fingernails and pads at the fingertips as animal clings to a branch. (Photograph by Catherine Hoogstraal Walker).

TEN TO TWENTY A DAY

Caburan, the spot to which our new friend Joyce took us (it is marked in large letters on some maps but consists of less than two dozen houses), is only irregularly reached by small boats, but this week the hemp boat was calling twice. I had sent Celestino and Oañe on the first trip with most of the equipment. When Wharton and I arrived a few days later we found that they had disembarked at the wrong place, two days' hard walk up the coast, and that Celestino had injured his foot in landing in the surf. I lacked almost all types of preserving and collecting equipnent, and Wharton lacked some of his larger cages. In reply to Joyce's instructions, his workers quickly began to bring in live tarsiers for Wharton's fabulous price of $5 American, which is equivalent to far more than a week's wages. They arrived at the rate of ten to twenty or more a day, and we quickly scurried around making additional cages of bamboo and urging children to hunt grasshoppers at a penny apiece and lizards and geckos at a nickel apiece for tarsier food. Tarsiers were brought tied to the ends of poles, in woven baskets of all descriptions, in tin cans, or wrapped in the captor's shirt.

We had struck this spot in January, just when dense thickets of low second-growth trees were being cleared for miles up and down the coast, and the work was often seriously interrupted as a cutter dashed after a tarsier and walked from one to ten miles to claim his reward. My end of the porch on which we were quartered was deemed most suitable for housing animals and at night my sleep was fitful as more than a hundred tarsiers loudly crunched grasshoppers and lizards, and scampered around in their fights. Their strong odor, by which Bila-an and Monobo natives say they can easily find tarsiers, did not improve my sleep, and neither did the restless twelve-foot python in a sack under my cot or the flying lemurs scratching at their cages. I dreamed of the python crawling over me, but when it finally did escape, it was done so unspectacularly that we did not know about it till we found the empty sack the next morning. My conscience is clear though I fear Wharton still suspects me.

'TARSIER MARKET' CRASHES!

The hemp boat paid its third visit, the last for some time, a few days later, and Wharton took his purchases back to Davao City where he could handle them more easily. I remained on to get some for our collections and to go into the forest and see where and how tarsiers actually lived. By this time the bottom had dropped out of the local market, especially since Wharton had used all of his money and much of mine, and so fewer were offered for sale and those at a third to a fourth of Wharton's price. Indeed, with my own collections, these were still more than I could adaquately handle, for it was some days before equipment from our lost party up the coast arrived, and still longer before Oañe could leave recuperating Celestino and join me. The area was rich in snakes and insects, and I had organized an almost hundred-mile-wide search for monkey-eating eagles, so time was well occupied though equipment was short.

(To be continued next month.)

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MEXICAN TEMPLE AND MARKET ACTIVITIES, A. D. 700-1500

By DONALD COLLIER

CURATOR OF SOUTH AMERICAN ETHNOLOGY AND ARCHAEOLOGY

A recently installed exhibit in the Hall of American Archaeology (Hall B) depicts the religious and commercial activities of the Indians who lived in highland Mexico from A.D. 700 to 1500.

Among the ancient Mexicans, religion and trade were much more intimately connected than they are in modern Western life. Both types of activity centered in the great plaza at the heart of each Mexican city. Market days were also feast days, when ceremonies were held in the temples alongside the market place. A substantial part of the articles of trade was used for religious purposes. Merchants had their own deity and depended on diviners to designate lucky days for beginning their trading journeys.

EXHIBIT ON RELIGION AND TRADE AMONG THE ANCIENT MEXICANS

These Indians, the best known of whom were the Aztecs, Toltecs, Zapotecs, and Mixtecs, lived by farming. They raised corn, beans, squash, gourds, tomatoes, peppers, avocados, cotton, turkeys, dogs, and bees. The economy was sufficiently developed to permit a large number of individuals to devote themselves to specialized crafts. There were spinners and weavers, potters, wood carvers, lapidaries, metal workers, feather workers, and tool makers. Each region specialized in one or more crafts. It was the products of these handicrafts—clothing and ornaments, tools and household utensils, luxury items and materials used in ceremonies—that formed the basis of Mexican trade. Inter-regional exchange of raw materials was also an important part of trade. Highland materials such as jade, gold, obsidian, cochineal, and red ocher were widely exchanged. From the hot lowlands came quetzal plumes, jaguar skins, and amber.

Tenochtitlan, the Aztec capital, which after the Spanish conquest became Mexico City, was the largest Mexican city, with a population of about 200,000. In the city was a great plaza containing the market place and a stone temple on top of a truncated pyramid. The market was held every five days. A ceremony was performed in the temple on market day, and offerings of flowers and food were made by vendors and buyers to the patron god of merchants. The market place was a large area of pavement bordered by arcades that sheltered the merchants. The following description of the market and the products sold there is taken from the account of Bernal Diaz, who took part in the conquest of the Aztecs in 1519:

ANCIENT MEXICAN MARKET SCENE

A painting by Museum Artist Gustav Dalstrom, based on Aztec drawings in the Codex Florentino.

"When we arrived at the great market place we were astounded at the number of people and the quantity of merchandise it contained, and at the good order and control that was maintained. . . . Each kind of merchandise was kept by itself and had its fixed place marked out. . . . [There were] dealers in gold, silver, and precious stones, feathers, mantles, and embroidered goods. . . . Next there were other traders who sold great pieces of cloth and cotton, and articles of twisted thread, and there were . . . [vendors] who sold cacao. . . . There were those who sold cloths of hennequen, and ropes and the sandals with which they are shod, which are made from the same plant, and sweet cooked roots, and other tubers which they get from this plant, all were kept in one part of the market in the place assigned to them. In another part there were skins of tigers and lions, of otters and jackals, deer and other animals and badgers and mountain cats, some tanned and others untanned. . . .

"[There were] those who sold beans and sage and other vegetables and herbs in another part, and those who sold fowls, cocks with wattles, rabbits, hares, deer, mallards, young dogs, . . . and let us also mention the fruiterers, and the women who sold cooked food, dough and tripe in their own part of the market; and every sort of pottery made in a thousand different forms from great water jars to little jugs, these also had a place to themselves; then those who

sold honey and honey paste and other dainties like nut paste, and those who sold lumber, boards, cradles, beams, blocks and benches, . . . and the vendors of . . . firewood. Paper, . . . reeds scented with *liquidambar*, and full of tobacco, and yellow ointments . . . are sold by themselves, and much cochineal is sold under the arcades which are in the great market place. . . . There are also buildings where three magistrates sit in judgment [over market disputes], and there are executive officers . . . who inspect the merchandise. I am forgetting those who sell salt, and those who make the stone [obsidian] knives, and how they split them off the stone itself. . . . There are for sale axes of brass [bronze?] and copper and tin [sic], and gourds and gaily painted [lacquered?] jars of wood. I could wish that I had finished telling of all the things which are sold there, but they are so numerous and of such different quality and the great market place with its surrounding arcades was so crowded with people, that one would not have been able to see and inquire about it all in two days."

CHOCOLATE BEAN MONEY

The Aztecs had no currency, so that barter was the usual means of exchange of goods. However, cacao (chocolate) beans had a standard value and served as money in equalizing exchanges. Ax-shaped copper plates were used in the same way.

The facts set forth in this account have been presented in the exhibit by means of paintings and models and the display of some of the raw materials and finished products that were exchanged in the market. The exhibit was designed by Mr. Gustav Dalstrom, artist in the Department of Anthropology, Mr. George I. Quimby, Curator of Exhibits, Anthropology, and the writer.

Books

(All books reviewed in the BULLETIN *are available in The Book Shop of the Museum. Mail orders accompanied by remittance are promptly filled—The Book Shop pays the postage on shipments.)*

JAMBA. By Wilfrid D. Hambly. Pellegrini and Cudahy, Chicago, 1947. 246 pages. Price $2.75.

Anthropologists are students of the lifeways and customs of men the world over and have made it their special task to examine the cultures of the lesser-known peoples of the world. These peoples, usually preliterate, often lead colorful and dramatic lives, whose examination affords the field anthropologist both pleasure and a wider perspective on the ways of mankind. Yet the welding of anthropological field data into a popular literary form that conveys to the nonspecialist the distinctive cast of an alien culture has not often been attempted with success. In writing the fictional life story of Jamba, a man of the Ovimbundu, Dr. Hambly has made this attempt and has done it successfully. *Jamba* is a book that should give pleasure to a large body of readers.

The Ovimbundu—People of the Fog—are a tribe that lives in the mist-covered country of central Angola, a Portugese possession in West Africa. Jamba's life is anchored to the small Ovimbundu village that is his home, but the events of his life are not confined to the limits of his own village. As a boy, his mother's brother, Manu—wise and strong as a mother's brother among the Ovimbundu should be—takes him on a rigorous journey to the neighboring Vochokwe tribe to undergo the initiation rites into manhood that ancient custom demands. Back home again, Jamba becomes a skilled hunter and, after a number of vicissitudes, marries Miapa, the girl of his choice.

Later Jamba becomes a leader of caravans, for the Ovimbundu were once renowned as adventurous caravan traders whose journeys penetrated far into the African hinterland. Then after the physical hardships of his caravan years, Jamba is betrayed by a lifelong rival, Kandimba, who acts as an informer for the government. Jamba has killed a decrepit slave to bring rain to his drought-stricken village. Kandimba tells the white governor, and Jamba serves a sentence on the coast at hard labor as a penalty. In the last act of his eventful life, Jamba, returned to his village and now an elder in his final years, slays his deceitful old rival Kandimba during a dance.

These are some of the episodes in Jamba's life, but their mere retelling does not indicate the compelling interest they hold in the book. For it is the colorful pattern of Ovimbundu life against which the action takes place that makes the events of Jamba's days significant and gives the story its punch. In recounting the life of Jamba, Dr. Hambly has been able to show the distinctive cast of Ovimbundu culture in a sympathetic and yet simply told, readable way.

The book is based on Dr. Hambly's field observations of the Ovimbundu. The descriptive details of the country and of village life have been seen by the author at firsthand and not merely culled from other sources, so that these details have the solid feel of authenticity. As the leader of the Frederick H. Rawson Expedition of the Museum to West Africa, Dr. Hambly spent a year conducting ethnological field work among the Ovimbundu.

Among the other noteworthy features of *Jamba* is the attractive format. The type is clear and readable, the motifs that accompany the chapter headings are very well done, and the book is enhanced by a colorful and well-designed jacket.

ALEXANDER SPOEHR
Curator of Oceanic Ethnology

The Library of the Museum, containing approximately 125,000 books and pamphlets—the largest specialized reference collection in the natural-history field west of New York and Washington—invites the general public to use its resources for study.

Streamlining in fishes is most perfectly developed in forms that live in the open sea, such as the mackerel, tuna, swordfish, and marlin (examples in Hall O).

CHRISTMAS SHOPPING NEED BE NO BURDEN— HERE ARE TWO SUGGESTIONS TO MAKE IT EASY

The burden of much Christmas shopping and preparing of many packages can be eased by using services Chicago Natural History Museum offers:

(1) Christmas Gift Memberships

Send to the Director the name and address of the person to whom you wish to give a Museum membership, together with your remittance to cover membership fee or dues. The Museum will handle all further details. For your convenience a CHRISTMAS GIFT MEMBERSHIP ORDER FORM is enclosed.

An attractive Christmas card notifying the recipient that through your generosity he has been elected a Member of the Museum will be sent, together with membership card or certificate and information on membership privileges.

(2) Museum Book Shop Gifts

The BOOK SHOP has books endorsed for scientific authenticity by members of the Museum staff, for both adults and children. You are invited to browse in the BOOK SHOP during part of your next visit to the Museum.

Where desired, the BOOK SHOP will handle mail and telephone (WABash 9410) orders and will undertake all details in connection with wrapping and dispatching gift purchases to the designated recipients, together with such forms of personal greetings of the season as the purchaser may specify.

SPECIAL EXHIBITION OF BIRD PHOTOS

A special exhibit of photographs of birds, made both in their natural habitats and from temporarily captured specimens under studio conditions for special studies, will be on display in Stanley Field Hall of the Museum from December 1 to 31. The photographs are the work of the Reverend John W. Baechle, C.PP.S., professor of biology at St. Joseph's College, Collegeville, Indiana.

For some years, Father Baechle, armed with a fast camera and birdbanding equipment, has made a hobby of studying bird life in the Rensselaer, Indiana, area. He has banded more than 10,000 birds and made portrait photos of some 78 species caught in the bird sanctuaries on the campus. Like many other birdbanders, Father Baechle aids the government in research on bird migrations, longevity, time of flight, and other phases of bird life. Data cards for each banded bird are filed with the Fish and Wildlife Service in Washington.

Father Baechle makes portrait photographs of each new species that he bands. Some of these are in black-and-white; others are in natural colors. His photographs are unusual, and many of them have been exhibited in other museums and reproduced in nature magazines.

BERMUDA EXPEDITION

Dr. Fritz Haas, Curator of Lower Invertebrates, and Mr. Joseph B. Krstolich, Artist, spent two months recently in Bermuda making studies for the production of true-to-life models of marine invertebrate animals. They studied the creatures under their natural conditions and collected specimens for the Museum's reference collection. The months chosen were most favorable, because of the calmness of the water. The Bermuda Biological Station for Research, on St. George's Island, not only provided ideal living and working accommodations on its own premises but, beyond that, did everything possible to assist the members of the Museum party by placing at their disposition its motorboats, with trained crews, and its entire collecting and observing apparatus, including a diving helmet. Dr. Dugald E. S. Brown, director of the station, was most helpful throughout the operations of the expedition.

Thus equipped and aided, Dr. Haas and Mr. Krstolich had the unique chance of studying at close hand the overwhelmingly rich animal and plant life of a coral reef, which, though often described in fervid terms by scientists and travelers, can nevertheless be understood only if seen. An especially close approach to the life associated with coral is made possible by the use of the diving helmet. The view from above, even through the blue and crystal-clear water, gives a wrong impression. What looked like flat coral-pads or like low, shrubby sea-fans, when viewed from above, turned out to be coralheads as high or higher than oneself or to be towering trees of sea-fans when one walked on the sea floor at a depth of twelve to fifteen feet. The enchanting blue color of the water was lost, however, for the light as seen within the water is grayish-green and somewhat dimmed, even at noon when the sun's rays penetrate almost vertically. It is planned to utilize the observations in producing at the Museum novel exhibits of the life of the sea.

MERRY CHRISTMAS and HAPPY NEW YEAR

The Museum will be closed on both Christmas and New Year's Day so that as many Museum employees as possible will be able to spend the holidays with their families. These are the only two days in the entire year when the Museum is not open to visitors.

MEETINGS OF A.A.A.S. AT THIS MUSEUM

The American Association for the Advancement of Science will hold its 114th meeting in Chicago this year, December 26 to 31. Headquarters for the various sections and societies will be in the Congress Hotel, Palmer House, Stevens Hotel, and Sherman Hotel, and most of the meetings will use the facilities of these hotels. However, some meetings will be held at Chicago Natural History Museum, at the University of Chicago, and at kindred institutions.

Gatherings scheduled for this Museum are as follows:

December 29—Daytime:

Limnological Society, Museum Lecture Hall, 9 A.M.

Systematic Section of the Botanical Society of America, James Simpson Theatre, 10 A.M.

December 29—Evening:

Association for Zoological Nomenclature, Museum Lecture Hall, 8 P.M.

Biology Smoker, Stanley Field Hall, 9 P.M.

The smoker will be a gathering of between 2,000 and 3,000 persons from a wide range of scientific societies.

The Museum endeavors to keep its exhibits up to date with recent important developments in science. In pursuit of this policy, the Department of Geology has an exhibit pertaining to atomic energy in Hall 36, and the Department of Botany has an exhibit illustrating sources of penicillin in Stanley Field Hall.

EXPEDITION RETURNS FROM ADIRONDACKS

Dr. Sharat K. Roy, Chief Curator of Geology, who was accompanied on a geological expedition to the Adirondacks and neighboring regions by Mr. Harry E. Changnon, Assistant Curator of Geology, returned to his post at the Museum last month.

Dr. Roy was responsible for the collection of igneous rocks, while Mr. Changnon restricted himself to the collecting of physical geology specimens. In addition to collecting specimens, Dr. Roy paid particular attention to the study of basic and ultra-basic igneous rocks, which, he explained, are very similar to stony meteorites. Dr. Roy is in charge of the Museum's meteorite collection, and his field studies of terrestrial rocks are a prelude to better understanding of the nature and mode of origin of the stony meteorites.

The specimens collected on this trip were restricted to selected types—only those that were needed for exhibits under preparation and those that bore special features requiring further investigations were collected. All specimens collected were tentatively sorted and identified in the field. They will now be checked and catalogued. Some of them will be added to the exhibits; others will go into the institution's study collections.

Serves 200,000 Children

Hundreds of lectures on natural-history subjects are given each year in the schools of Chicago by members of the staff of the Museum's James Nelson and Anna Louise Raymond Foundation for Public School and Children's Lectures. The Foundation also provides tours, lectures, entertainments, and other events within the walls of the Museum for close to 200,000 children a year.

NEW MEMBERS

The following persons became Members of the Museum during the period from October 16 to November 15:

Associate Members

Mrs. Fred A. Hansen, Mrs. Walter A. Krafft, Lloyd Langdon Mills, Marvin G. Probst, Frederick L. Regnery, David T. Siegel, Mrs. R. Arthur Wood.

Annual Members

Arthur L. Brooks, James J. Carroll, Charles H. Collings, Warner S. Conn, Charles E. Cook, Robert B. Cook, John R. Doolittle, Charles L. Fair, Albert Fisk, Arthur E. Frankenberg, Miss Juliet T. Goodrich, R. Emmett Hanley, H. Nels Holgate, Hubert E. Howard, Miss Barbara Leslie Huxtable, Mrs. Ralph R. Kimball, David E. Loebe, Harry A. Lund, Miss Dorothy Macdonald, John F. McGraw, P. V. Moulder, Mrs. Joseph C. Sampsell, Henry A. Slamin, Mrs. Edward J. Stokes, Miss Lillian Stevenson, Frederick S. Weiser.

THE "INSIDE STORY" OF THE TARSIER

By HARRY HOOGSTRAAL
ASSISTANT CURATOR OF INSECTS

(Second and concluding installment.)

SEVERAL times, hunting with a headlamp at night, I saw tarsiers hopping from branch to branch in the thick second-growth and twice saw them making long jumps on the ground. It is said locally that if one makes a fire in the woods at night, tarsiers will gather around "to keep themselves warm," but I did not test the veracity of this story.

In the course of a week's daytime hunting over the area already covered by the local men, women, and children I found eighteen tarsiers, always tightly clutching slender trunks or branches from four to ten feet above the ground, usually in dense, deeply shaded thickets, but three times surprisingly openly exposed. When approached, there is usually a slight movement of the head, though I did not see the great revolution of which the head is capable; and always there is the peculiar almost fan-like opening and closing of the ear and twitching of the ear. Three times I found a pair in the same tree, once a mother with a large baby and twice two tarsiers in the nearby trees. The local people say that several are sometimes found in the same tree, and this is quite probably true. Only when their tree is cut or most violently disturbed do tarsiers jump during the daytime. If picked up by the nape, they open their mouth and will, if allowed, draw blood with their tiny but sharp, needle-like teeth.

TARSIER AND YOUNG
A painting made for Mr. Hoogstraal by Helen Grove, of Chicago

SILENT EXCEPT IN FIGHTING

Several of our observations of captive tarsiers should be mentioned—characteristics I failed to observe when watching or capturing tarsiers in the forest. When fighting among themselves in crowded cages, tarsiers often utter a single, loud, shrill, high-pitched trill, though they were always silent when surprised in the forest, and during three weeks of night hunting, when I was sure there were several about, I did not hear the sound. In the cages, when one is being bullied by another, the victim often backs into a corner, stands up on its hind legs with its arms out and upwards and fingers far apart, with a look of frozen horror on its face, and remains rigidly in position for as long as half an hour. Some actually topple over and die at the end of this period. One would suppose, after seeing such an extreme example of fright, that even a sleeping tarsier, when greatly disturbed during the daytime in its own haunts, would display some activity, but all those noted in the forest were absolutely docile until handled, and then merely curled up as if frightened, unless given an opportunity to bite.

In an old reference it is stated that tarsiers live under the roots of trees, but all those I saw or inquired about came from branches or upwards on the slender trunks of trees.

The tarsiers' food, obtained of course only at night, consists in large part of lizards and insects, probably mostly orthopterous insects, beetles, and spiders. Rather than injure the valuable internal organs to examine the stomach contents, we injected the digestive system with adequate amounts of preservative so that when the bodies are dissected for anatomical studies, the stomach contents can be examined in volume. There are no small rodents in lowland Mindanao, and though Wharton has been able to feed his captive specimens on small mice, I seriously doubt that wild Mindanao tarsiers feed on rodents. I doubt, too, that the tarsier, which is equal in size to a medium-sized rat, would be able to hold its own in a fight with one.

Almost all Filipinos who were acquainted with tarsiers told us that they subsist solely on carbon or burned wood, and the same story is quoted in the earliest published works about the Philippine tarsier. It is probably because of this that the Mindanao species was named *carbonarius*. I urged Wharton to place burned wood in the cages, but we were unable to detect any interest on the part of the tarsiers.

POUNCE ON VICTIMS FOR FOOD

Food is obtained by leaping upon it with all fours or reaching for it with one or two hands, and unless the captive is too large it is held in the hands and eaten, either on the ground or in a branch, but preferably the latter. Some lizards taken were so large that the tarsier actually had to crouch on them to keep them quiet enough to be eaten without too much disturbance. The head of lizards and insects is always eaten first, and as one end disappears the remaining body is moved into position under the mouth and the greedy crunching continues unabated. One family of Bila-ans told us they had kept a pair of captive tarsiers for a year, feeding them entirely on bits of meat.

All of our evidence points to second-growth thickets as a most favorable place for tarsiers to multiply even to the point of abundance. Celestino at his collecting station about half-way between Caburan and Davao City obtained about fifteen specimens from pagan tribes who took them from similar locations there, and when Castro later visited the Sarangani Bay area of southern Mindanao he obtained an equal number from Bila-ans who were also clearing second-growth.

A Filipino colonel told us of a place on the northeastern coast where tarsiers were so abundant that they "could be picked out of bamboo and small trees" with hardly a search. The Bohol species is known to inhabit a certain bamboo area, but we did not find any in an extensive bamboo grove near Todaya, at about 2,500 feet elevation on Mt. Apo, and the Bogobo people there, who seldom if ever venture into the lowlands, were unable to associate our descriptions with any animal they know. One of the specimens purchased by Wharton from the northern end of Davao Gulf was understood to have been taken while hopping on the ground in a cornfield during the daytime,

but I am convinced, after investigation, that this is misinformation due to translation in various dialects and languages before reaching him.

The wasteful kaiñgan system of agriculture, widely practiced by pagan and Christian Filipinos in Mindanao, appears to offer much opportunity for the spread of the tarsier. Small or even rather large areas are cleared of original dipterocarpus forest, planted to corn, camotes, or other vegetables for a few seasons, and then abandoned to scrubby second growth (and tarsiers!). When these areas are clean-cut for coconut or abaca plantations, tarsiers in them are endangered, for they are not only quickly captured, sometimes for food, at other times as usually short-lived pets (or for the rare museum expedition), but they probably find less favorable conditions if they move to original forest or to grass land.

At the present time, the human population in Mindanao is not dense enough to threaten the tarsier. Though the government is urging settling there, there is little pioneering spirit among the Filipinos. Fear of Moros in some areas and political unrest in others are great. The hope in some quarters that American capital would open large areas of Mindanao is apparently not materializing. Some pressure is being applied to abolish the kaiñgan system of agriculture, but inability of enforcement insures its survival for a long time to come in large parts of Mindanao. Lumbering is so lucrative that it will probably become more extensive in Mindanao, and probably eventually provide even more tarsier land. Along the coast, much second-growth will undoubtedly give way to coconut land, but inland, at least until adequate roads are built and the cost of transportation is reduced, coconut will hardly become an extensive crop. Abaca, or Manila hemp, can be grown successfully only under restricted conditions of soil and rainfall, and so will never be too weighty a factor in the reduction of numbers of tarsiers. Such matters are of interest to wildlife conservation groups, which are justifiably concerned with the protection of man's most fascinating living ancestor.

FULLY FORMED AT BIRTH

Tarsier babies are born singly, fully formed and with their eyes open, though their heads, hands, and feet are disproportionately large. They remain clinging monkey-like to their mothers till quite large. More than a dozen young are among our hundred or more specimens, the bulk of which were taken during January. Apparently many females were pregnant; the exact number will be determined when the preserved bodies are dissected at a later date.

The tarsier is regarded with great superstition by a number of pagan Filipino tribes. Professor J. Otley Beyer of the Department of Anthropology, University of the Philippines, has an extensive collection of these superstitions, which we hope he will publish. He tells us that most of them are from the islands of Bohol, Leyte, and Samar, and only one is from Mindanao, that from the northeastern corner. In southeastern Mindanao we were unable to discover any superstitions concerning these animals among the wild tribes, though they have many regarding other birds and animals. In northwestern Cotabato, where Werner took a party in December and January, supersititions were so strong that the pagan peoples actually refused to tell where tarsiers might be found. Werner did not obtain details about these superstitions, and none of his party was able to locate tarsiers in that area.

Captive and pet tarsiers are not only fascinating creatures, but observation of them, especially at night, gives much insight into their peculiar habits. We have promised to reserve our information on their "night life" for Lieutenant Wharton, and his report will appear elsewhere soon.

DECEMBER LECTURE TOURS

Tours of exhibits, under the guidance of staff lecturers, are conducted every afternoon at 2 o'clock, except Sundays and certain holidays. On Mondays, Tuesdays, Thursdays, and Saturdays, general tours are given, covering all departments. Special subjects are offered on Wednesdays and Fridays (the Friday tours open with an introductory lecture and slides or films in the meeting room on the second floor of the Museum); a schedule of these follows:

Wed., Dec. 3—What Makes Us Human—The Story of People (*Harriet Smith*).

Fri., Dec. 5—The Parade of Insects. Illustrated introduction with color pictures in Meeting Room (*Lorain Farmer*).

Wed., Dec. 10—Fashions in Furs (*June Buchwald*).

Fri., Dec. 12—The Earth's Green Mantle. Illustrated introduction with still pictures in Meeting Room (*Marie Svoboda*).

Wed., Dec. 17—Christmas Greens—Mistletoe, Holly, and Evergreens (*Miriam Wood*).

Fri., Dec. 19—Reading the Earth's Diary. Illustrated introduction with color pictures in Meeting Room (*Winona Cosner*).

Wed., Dec. 24—Men of the Old Stone Age (*Marie Svoboda*).

Fri., Dec. 26—New Years' Festivities. Illustrated introduction with color pictures in Meeting Room (*Harriet Smith*).

Wed., Dec. 31—At Home in the Animal World (*Jane Shorpe*).

The Museum will be closed two Thursdays, December 25 and January 1, because of the Christmas and New Year's Day holidays.

STAFF NOTES

Mr. Harry Hoogstraal, Assistant Curator of Insects and leader of the Museum's recent Zoological Expedition to the Philippines, will participate in the University of California African Expedition as representative of this Museum. He will leave December 26 for one year, and his explorations will cover Africa from Cairo to Capetown. He will assemble a collection of insects for this institution and will engage in research, the results of which will be published by the University of California. . . . A safe flight to Guam is reported by **Mr. Henry S. Dybas,** Assistant Curator of Insects, and he has left that island by steamer for the Palaus where he is to participate in a cooperative expedition under the auspices of the Pacific Science Board. . . . **Dr. Rainer Zangerl,** Curator of Fossil Reptiles, has returned from field work in Switzerland, France, Italy, and Germany. . . . **Mr. Colin C. Sanborn,** Curator of Mammals, spent several weeks last month collecting small mammals on a field trip in Arkansas. . . . **Mr. Orville L. Gilpin,** Preparator of Fossils, in the Department of Geology, has been appointed Chief Preparator of Fossils, to fill the vacancy caused by the recent resignation of **Mr. James H. Quinn.** . . . *The Journal of Negro History* has published a directory of "Visual Aids to Teaching African Ethnology," compiled by the Museum's Curator of African Ethnology, **Dr. Wilfrid D. Hambly,** as a member of the Committee on African Anthropology of the Division of Anthropology and Psychology, National Research Council. It lists the sources of motion-picture material available for the presentation of graphic studies of African life and is intended as an aid to those in charge of anthropological courses in universities and other schools. . . . **Dr. Theodor Just,** Chief Curator of Botany, conducted a session of a seminar on "Continental Displacement" at Northwestern University last month. Sessions on other phases of the subject are to be conducted by **Mr. Karl P. Schmidt,** Chief Curator of Zoology, and **Mr. Bryan Patterson,** Curator of Paleontology. . . . **Dr. Hugh C. Cutler,** Curator of Economic Botany, conducted a seminar on "Plants and People in Bolivia" at Iowa State College, Ames, and attended a conference of U. S. and Canadian authorities on structure of corn plants, held at St. Louis.

The prevalence of bathtubs in this country is regarded by the world as an index to America's high standard of living; but two ancient Roman bronze bathtubs, one in Stanley Field Hall and one in Edward E. and Emma B. Ayer Hall (Archaeology of Etruria and Rome, Hall 2), resemble very closely in size, shape, and design the "typical American bathtub."

Chicago Natural History Museum

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Members are requested to inform the Museum promptly of changes of address.

NOTED CHINESE SCHOLAR HONORED BY MUSEUM

BY KARL P. SCHMIDT
CHIEF CURATOR OF ZOOLOGY

Dr. Ch'eng-chao Liu, Professor of Zoology at West China Union University, Chengtu, China, was recently appointed Research Associate in the Museum's Division of Reptiles, in recognition of his outstanding work on the amphibians and reptiles of China and of his now long-continued association and co-operation with the Museum.

DR. C. C. LIU

Dr. Liu's personal and scientific history is most interesting, and presents perhaps an almost typical example of the impact of war on Chinese scholarship and of the Chinese reaction to the misfortunes of war. Dr. Liu, on his graduation from Yenching University (Peiping) in 1931, took a teaching position at the University of Mukden. He had already become one of the best students of amphibians and reptiles in China, and had begun to accumulate a library of herpetology and to collect actively in Manchuria. The Japanese invasion in 1931 (regarded by many as the actual beginning of World War II) forced Dr. Liu to flee to China; his collections were destroyed and his library was dispersed.

To make a new start, after a conference with his teachers at Yenching, Dr. Liu applied to the Rockefeller Institution for a fellowship for graduate study in the United States and spent the years 1933 and 1934 at Cornell University, receiving the degree of Doctor of Philosophy. During this period he spent the two summers in study in the Division of Reptiles at the Museum, and an extensive paper on the secondary sex characters of frogs, one of the results of his work, was published by the Museum.

CAUGHT IN ANOTHER INVASION

With the aid of a growing number of American friends, Dr. Liu again built up a personal library in his field of interest, this time by far the best in China. On his return to China he took up teaching at Suchow University, where he was again caught in a Japanese invasion in 1937 and again forced to flee, with the total loss of his now extremely valuable library and of his new collections. He became one of the refugees among the Chinese scholars who made the long and circuitous journey to western China, and at Chengtu found refuge (except for recurrent bombings) from the Japanese armies and opportunity to continue teaching and research.

The West China post proved most favorable to collecting, and the transplanted scholar spent every summer season in active field work, at his own expense, in the mountains that border the Tibetan plateau. He visited the dangerous country inhabited by the wild Lolo tribes, the Tibetan plateau itself, and the Mupin region (the country of the giant panda); and he repeatedly collected on Mt. Omei, famous in China as a sacred mountain.

His collecting and field study were focused on the remarkable life histories of frogs, with the adaptations of both adults and tadpoles to mountain torrents and to lowland quiet streams and pools. It soon became evident that he had found a rich fauna in which the description of numerous new species of salamanders and frogs was a necessary preliminary to the study of life histories.

The good fortune of a grant from the Cultural Division of the State Department brought Dr. Liu to the United States in September, 1946, and he brought collections and manuscripts direct to Chicago Natural History Museum, where he was certain of welcome from his colleagues in Chinese herpetological studies, Curator Clifford H. Pope and the writer, and where he felt that his projected account of the *Amphibians of West China* could best be completed.

During the succeeding year, a large manuscript, based on collections turned over to the Museum and on the remarkable series of illustrations and water color paintings accumulated in the eight years in West China, was prepared for publication. With it, Dr. Liu takes his place as the principal authority in the world on the systematics and habits of Chinese amphibians.

BIRD GUIDEBOOK

The Museum switchboard is a busy instrument. People from all over Chicago and its suburbs call to ask questions of all kinds or to verify the accuracy of information obtained elsewhere. Probably most of the questions are directed to the Department of Zoology, and the Division of Birds receives the largest number of these.

So many questions relate to bird nesting and bird migration that it is obvious that the general public is unaware of the excellent 50-cent pamphlet, *Birds of the Chicago Region*, by Edward R. Ford, Colin C. Sanborn, and C. Blair Coursen, published in 1934 by the Chicago Academy of Sciences and obtainable at the Museum Book Shop. This pamphlet gives the migration and nesting dates—early, average, and late—of the birds that occur within a 50-mile radius of Chicago. It also gives the specific localities in which many of the common birds are likely to be seen, and tells where rare birds have occurred.

Although this work is thirteen years old, it is still authentic, because the migration and nesting habits of few species change appreciably. Interested persons would find in it the answers to questions that have been puzzling them and keeping the Museum switchboard busy. —E.T.S.

War-Delayed Journals

The backbone of any research library consists of serial publications such as journals, transactions, reports, and proceedings. In a recent month the Library accessioned 531 volumes, of which roughly 80 per cent would fall into this category.

Journals delayed by the war continue to arrive in blocks at a gratifying pace. Even so, it will probably take years before all the gaps can be filled. Examples of this type of material recently received are:

Société des Africanistes. *Journal.* V. 10–14 (1940–1944)

Royal Geographical Society of Australasia. South Australian Branch. *Proceedings.* V. 39–46 (1939–1945)

Société Linéenne de Lyon. *Bulletin mensuel.* V. 11–14 (1942–1945)

Odd Number of Rows on Corn Ears

Ordinary corn practically always has an even number of rows of grain. In lowland Bolivia, however, there is a small area where ears of corn with an odd number of rows of grain are as common as ears with an even number. Some of the first ears to be collected in this area are shown in the small case next to Case 32 of Hall 25.

AMERICA'S VANISHING PLANT RESOURCES

By HUGH C. CUTLER
CURATOR OF ECONOMIC BOTANY

The passenger pigeon is frequently mourned as the victim of man's greed. The same disregard for our American resources is depleting our stock of plant varieties, a heritage more valuable than the passenger pigeon or even the old herds of buffalo.

Case 14 in Hall 25 contains a collection of corn varieties commonly grown ten to thirty years ago. From year to year these ears become more valuable because the varieties shown are quite rare and may soon be lost. Actually, these varieties are at present in the same situation as the buffalo was a few decades ago. If prompt measures are taken to preserve them, they may still be saved from extinction.

When white men settled the Americas they found many kinds of cultivated and wild plants that were useful to the Indians. Some of these plants were immediately adopted by the new settlers. Others were neglected. Some of the plants that were neglected could not live unless planted and cared for by man. These plants were lost and, even if the same variety of plant was being grown in other regions, the stocks peculiar to any region in which the plant was abandoned were lost.

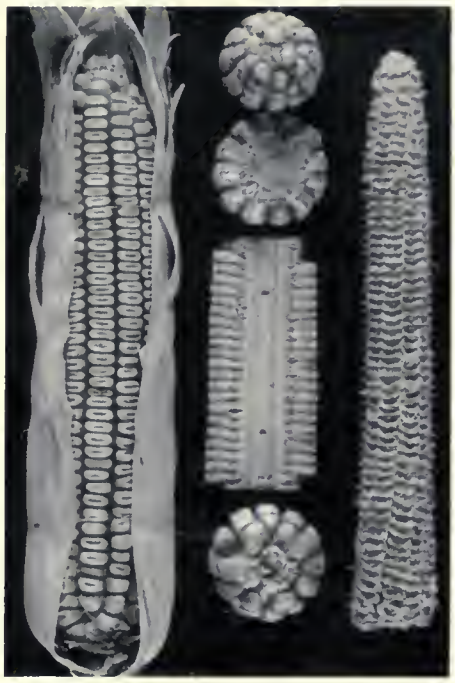
Many plants are highly variable. In corn this is readily apparent when red ears, white, and yellow, sweet grains, pop, and dents are compared. These are all variations of the main pattern of plants that we call corn, and there are many other variations. Sometimes the presence of a single variation will make a plant more valuable than plants that lack this character. Sweet corn, for example, would be of little use if it lost the single factor that increases the sweetness of the grains.

NEW SOURCE OF ADHESIVE

During the last war, when supplies of cassava for making vitally necessary adhesives could no longer be imported from the East Indies, scientists discovered that the type of corn called waxy had a composition that was suitable for the manufacture of adhesives. Previously, waxy corn had been grown by plant breeders only as suitable material for the study of inheritance. As the plants yielded much less grain than field corn, it was decided to transfer to a good field corn the single factor controlling the waxy grain character.

Generally, plants are composed of an almost random assortment of characters inherited from their parents. Thus in the progeny of crosses of waxy corn with commercial field corn, there could be expected some plants with the waxy character and many of the high yielding characters of the field corn. Actually, after careful breeding and selection a plant was produced that differed from field corn only by the waxy factor. This factor, waxy, made corn a good source for an essential material. Later a similar waxy factor was found in sorghum, providing a sorghum plant source for adhesives in addition to that of waxy corn.

These factors that control the inheritance and expression of characters in plants and in animals are called genes. New genes are produced very seldom. When the characters controlled by new genes are outstanding, such changes are commonly called sports. However, the real term for such sudden changes is mutation. It is applied



GOLDEN BEAUTY DENT CORN
Grown in central Illinois in 1902.

not only to the very rare striking changes but also to many minute and scarcely noticeable ones which are more common. Since mutations appear so infrequently and breeders need new gene materials for their work, there have been many attempts to increase the rate at which mutations appear. X-rays, heat, cold, and chemicals have been tried with some success, but the mutation rate is still very low and most mutations are harmful. For practical purposes, we must still depend upon our natural reserves of variability in living wild and cultivated plants, as genes are parts of living plants.

MANY VARIETIES DISCARDED

When white men began to plant Indian maize, they first tried the varieties that had been grown by the Indians. Gradually they selected those which best fitted their needs and discarded the rest. Thus most of the flour corns were soon abandoned because the white invaders preferred wheat flour. The flint corns were discarded in most areas because the whites seldom used the parched corn which Indians relished. Brightly colored ears were of little value to Europeans who did not share the Indian religious beliefs and superstitions concerning them.

Gradually white men selected a few types of pop and sweet corn. From the progeny of a mixture of southern dent corn and northern flints they produced a new type of dent corn. For a long time each farmer had his own particular corn. However it was found that certain farmers had corn that produced well and that was not too hard for animals to chew nor so soft that it spoiled easily. Some of the types developed at the end of this period are shown in Case 14 of Hall 25.

The most famous of the varieties selected by midwestern farmers was Reid's Yellow Dent. There was always enough variation in the plants and ears so that many characters were preserved. Most of the commercial hybrid seed is developed from selections of Reid's Yellow Dent.

Hybrid seed is a cross of highly selected but differing strains of corn. To produce the parents of the cross it is necessary to select corn and to breed each plant with itself or with a sister plant until any hidden deleterious characters are revealed and the plants are uniform. This breeding with close relatives or using the same plant as both male and female parent is called inbreeding, and the resulting plants are called inbreds. Two different inbred strains are then crossed to produce hybrid seed. This is known as a single cross. Since inbreds are weak plants and the seed is expensive to produce, most commercial hybrid seed is from double crosses. This is produced by crossing two single cross hybrid plants.

VARIATIONS NEARLY WIPED OUT

In the production of the inbred lines many variations were discarded and an attempt was made to secure maximum uniformity within the inbred strain. Thus we have nearly reached the end in our reckless pursuit of better crops. First we abandoned those Indian varieties that possessed a wealth of variability but did not suit our needs. Then we selected closely in the remaining varieties and discarded any others that did not suit the ideal of the moment or did not produce enough to satisfy the farmer. Now we have taken a small number of these selected ears and have inbred them so that a single plant may be the sole ancestor, the mother, father, grandparents, great-grandparents, of millions of other plants. Our once great stock of variation in corn has vanished.

Samples of some products made from corn are exhibited in Halls 25 and 28. Most of these are made from one kind, the commercial hybrid field corn. This serves as an all-purpose corn. With the advance of industry and agriculture it is likely to prove more economical to produce a variety of corn especially suited for the production of some particular material such as oil, wax,

fiber or cellulose. Hybrid corn would provide a very small store of variations from which the best materials for plant-breeding could then be chosen.

Corn is just one example of the destruction of our stockpile of breeding materials. When all the trees of one kind in any area are destroyed, or even when only the best are cut out, we lose some of the variations in that species that made it possible for the plant to live and to compete with other plants in that area. The same kind of tree from another region will not have all the same variations or the same combination of genes. If we want to reforest an area we may lack plants with characters that could increase the vigor of the tree, its rate of growth, or its resistance to disease, insects, and droughts. Growing inferior seedlings is slow and unprofitable.

RECORD SPECIMENS IN MUSEUM

The Museum is preserving a collection of the variations in plants. Some of these are shown in the exhibit cases and more are preserved in the study collections and the herbarium. These will serve as a record of the history of these plant species and as an index of their present or past variability.

The Museum cannot preserve living material either as plants or as seeds. Seeds must be considered as living material as long as they can still be made to germinate and grow. After a short time most seeds fail to germinate. In a few weeks elm seeds are no longer viable. Rubber tree seeds retain their life for only a few months. Under ordinary conditions even corn seeds are useless after eight or nine years. It is possible to prolong the life of seeds by keeping them in cold storage. Preservation in an atmosphere of inert gases also appears to help. Unfortunately we know very little about the best way to maintain our stock of plant resources and no large scale attempt to conserve our rapidly diminishing supply of variability has ever been made. This problem should really be studied by the government as part of its program to conserve our national heritage, and by industry as a safeguard to ensure the continued production of economically important raw materials.

Technical Publications Issued

The following technical publications were recently issued by Chicago Natural History Museum:

Fieldiana: Zoology, Vol. 31, No. 19. *A New Genus of Batflies from Guatemala (Diptera Acalypterae: Streblidae).* By Henry S. Dybas and Rupert L. Wenzel. Aug. 19, 1947. 6 pages, 3 text figures. $0.10.

Annual Report of the Director to the Board of Trustees. By Clifford C. Gregg. Aug. 27, 1947. 140 pages, 5 plates, 22 text figures. $1.

Fieldiana: Zoology, Vol. 32, No. 4. *Catalogue of Type Specimens of Mammals in Chicago Natural History Museum.* By Colin Campbell Sanborn. Aug. 28, 1947. 88 pages, 1 halftone. $1.

Fieldiana: Zoology, Vol. 31, No. 20. *The Distribution of Leurognathus. A Southern Appalachian Genus of Salamanders.* By Clifford H. Pope and Nelson G. Hairston. October 6, 1947. 8 pages, 2 text figures. $0.10.

Fieldiana: Zoology, Vol. 31, No. 21. *The Subspecies of Aratinga Acuticaudata.* By Emmet R. Blake and Melvin A. Traylor, Jr. Oct. 20, 1947. 8 pages. $0.10.

Botanical Series, Vol. 23, No. 5. *Studies of Central American Plants—VII.* By Paul C. Standley and Julian A. Steyermark. Oct. 22, 1947. 74 pages, 4 text figures. $0.75.

Fieldiana: Zoology, Vol. 31, No. 22. *Malacological Notes—V.* By Fritz Haas. Oct. 27, 1947. 18 pages, 8 text figures. $0.35.

LAST CALL FOR ENTRIES OF NATURE PHOTOS

All entries for the Third Chicago International Exhibition of Nature Photography must be received at the Museum on or before January 17. The contest is sponsored by the Nature Camera Club of Chicago. Entry forms are available by application either to the Museum or to Miss Louise K. Broman of the Camera Club, whose address is 6058 South Troy Street, Chicago 29.

The entries will be judged on January 24 and 25. The public exhibition of the entries selected is scheduled for February 1 to 28, inclusive, in Stanley Field Hall of the Museum.

For those interested in submitting prints (either black-and-white or color) or color transparencies, a summary of the principal conditions follows:

There will be two divisions, prints and transparencies; entry fee $1 in each. No more than four entries may be submitted in either division.

There are three classifications in each division: (A) Animal Life—animals, birds, insects, tracks, nests, etc. (no domestic animals). (P) Plant Life—flowers (except formal arrangements), trees, shrubs, fungi, etc. (G) General—scenery, geological formations, etc.

Prints must be on 16″ x 20″ mounts. They may be any size up to that of the mounting. Each must be entirely the work of the individual contributor and must show, on the back, title, classification, and maker's name and address.

Color slides or transparencies should not exceed 3¼″ x 4″ and must show title and maker's name and address. Each must be spotted in the lower left-hand corner.

Immediately after judging, notification of acceptances will be sent each contributor. A catalogue will be sent at the close of the exhibition. All accepted prints and slides will receive stickers. All contributors will receive the Exhibition Bulletin for a year. A number of accepted entries will be reproduced in the Museum BULLETIN, the P.S.A. Journal, and elsewhere. Permission for such reproduction is presumed.

Silver medals and ribbons will be awarded in the various print and slide classifications. All winners will receive the Museum BULLETIN for a year, and their names will be inscribed on the Myrtle R. Walgreen plaque. The Color Division of P.S.A. is awarding a silver medal to a slide outstanding in its illustration of complementary colors in nature and a second medal to a slide illustrating adjacent colors.

The exhibition will be conducted in accordance with the recommendations of the P.S.A.

GIFTS TO THE MUSEUM

Following is a list of some of the principal gifts received during the last month:

Department of Anthropology:

From: Miss Florence Dibell Bartlett, Chicago—3 Navaho blankets (late 19th century), Arizona and New Mexico; Aaron B. Mead (deceased)—26 dentalium shells used as medium of exchange, Puget Sound, Northwest Coast; Mrs. Chauncey McCormick, Chicago—2 amulets of animal gods (26th Dynasty or later), Egypt; Richard A. Doubleday, Morgan Park, Ill.—a boy's costume, Guatemala; Gradie Oakes, Chicago—about 500 archaeological specimens (Archaic and Woodland types probably ranging in time from A.D. 500 to 1600), Kentucky.

Department of Botany:

From: University of Texas, Austin—957 herbarium specimens, Mexico; Prof. M. M. Lacás, Monterrey, Mexico—125 herbarium specimens, Mexico.

Department of Geology:

From: Maurice Petit, St. Thomas, V. I.—20 Upper Cretaceous invertebrate fossils and 3 lithological samples, Virgin Islands; Dr. Dugald E. S. Brown, St. George's West, Bermuda—48 invertebrate fossils, Bermuda.

Department of Zoology:

From: Philip D. Sang, River Forest, Ill.—a Japanese long-tailed jungle fowl, Japan; Lincoln Park Zoo, Chicago—21 crabs, 9 lizards, 3 turtles, and an Indian otter; Harold Trapido, Panama City—a snake, 4 lizards, and 5 frogs, Puerto Rico; Henry S. Dybas, Chicago—1,508 insects and allies, United States and Palau Islands; W. E. Eigsti, Hastings, Neb.—60 ectoparasitic insects and allies, Nebraska; Dr. E. C. Williams, Chicago—37 ticks, Chicago; Leslie Hubricht, Battle Creek, Mich.—1,037 nonmarine shells, Michigan; Major Robert Traub, Washington, D.C.—2 bats and 8 rodents, Mexico; William Brandt, Herrala, Finland—20 moths, including 3 paratypes, Europe and Iran; Delzie Demaree, Jonesboro, Ark.—100 fresh-water clams, Arkansas; New York Zoological Society, New York City—2 pouch young of water opossum; Miss Laura Brodie, Chicago—74 specimens of snakes, lizards, frogs, and salamanders, South Carolina, Virginia, and Texas; Henry Van der Schalie, Ann Arbor, Mich.—35 fresh-water clams, Kentucky.

Library:

From: B. Benesh, Downey, Ill.; Charles B. Cory, Homewood, Ill.; Modesto Chavez Franco, Guayaquil, Ecuador; John Francis Neylan, San Francisco; Karl P. Schmidt, Homewood, Ill., Dr. Austin L. Rand, Chesterton, Ind.; and Harry Hoogstraal, Mrs. Thomas Temple Hoyne, Dr. W. L. McAtee, and Miss H. Elizabeth Story, all of Chicago.

Rear-Admiral Richard E. Byrd's expeditions to the south polar regions are represented in the Museum by a habitat group of emperor penguins (in Hall 20) and by a group of Weddell's seals (Hall N).

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